cycles

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Charter

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The charter of the Foundation provides that the purposes for which it is formed are the following: To foster, promote, carry on, and conduct scientific research and to receive, administer, and disburse funds for scientific, educational and charitable purposes, all for the public welfare.

No part of the net earnings of the corporation shall ever inure to the benefit of any member of the corporation or individual.

The activity of the Foundation, by self-imposed limitation, is concerned with the study of rhythmic fluctuations in all fields of natural and social science.

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THE DIRECTOR'S LETTER

Dear Member:

I have the feeling that probably less than half of our members understand what our activities are all about. If this is so it is my fault, because it is my job to make everything plain. Let me therefore, in this letter, clarify some things:

Fact vs. Opinion

First of all let me make it clear that we are concerned with *fact* and not with *opinion*. We deal *only* with fact.

A letter that came in the other day said, 'I wish I knew what you really think.' My dear friend, *I don't think!* Certain things I *know*: beyond that I try not to go!

Examples of Fact

Let me give you some examples of *fact*, *and* then point out the difference between *fact* and *opinion*. I'll use stock market figures as an example, as, seemingly, almost everybody is interested in gambling in stocks.

For my example I'll use the annual figures of the Standard and Poor's Corporation Combined Stock Price Index, 1935-39 =100. This index is available from 1871 through 1956; 1957 can be estimated from the new S. & P. Index, 1941-43=10. This span of time gives us 87 figures to work with; 86 changes from one year to the next.

47 Advances; 38 Declines

Of these 86 changes, 47 have been up; 38 have been down; 1 showed no change. This is the characteristic behavior of this series of figures. This is a *fact*. If this behavior continues (a reasonable assumption), the odds are 47 to 39 (1.2 to 1) in favor of a *rise* from any one year to the next—from 1957 to 1958 for example. Based on our assumption, *this also is a fact*.

Runs

Let us call an *up*, or an unbroken succession of ups, a **bull** market; a *down*, or an unbroken succession of downs, a **bear** market; no change, a **mugwump** market. (A mugwump is a bird that sits on the fence with his mug on one side and his wump on the other!) Using these definitions (and ignoring the first and last examples, as we don't know the ultimate length of these two sequences) we find that we have 18 bull markets, 17 bear markets, 1 mugwump market.

Bull Markets

Of our 18 bull markets we have—

8 bull markets lasting 1 year,
4 bull markets lasting 2 years,
1 bull market lasting 3 years,
3 bull markets lasting 4 years,
1 bull market lasting 7 years,
1 bull market lasting 8 years:

Bear Markets

Of our 17 bear markets we have—

5 bear markets lasting 1 year,
8 bear markets lasting 2 years,
2 bear markets lasting 3 years,
1 bear market lasting 4 years,
1 bear market lasting 5 years.

The Application

These also are facts. Now let us apply these last named facts to the present situation. By definition, we are in a bear market, as prices in 1957 were lower than prices in 1956. We know that, of the 17 past bear markets, 5 lasted 1 year, 12 lasted more than 1 year. If this characteristic of stock price behavior continues, the odds are 12 to 5 (2.4 to 1) that the value of this index in 1958 will be *lower* than the value in 1957. This is another fact, and one well worth taking into account.

Refinements Possible

These facts are very crude ones and pertain merely to *direction* of *annual* figures. They can be refined by making them pertain to *extent* as well as to direction, and pertain to *monthly, weekly,* or *daily* figures as well as to annual ones. Facts such as these are useful—nay, invaluable—in assaying the odds and the probabilities of the future.

Rhythm—Another Sort of Fact

In addition to the numbers of times up versus the number of times down, the extent of run, the percentage gain or decline in any one day or week or month or year, the extent of advance before a decline, and the extent of decline before an advance, there is another very useful sort of fact—namely the *wave motions* which characterize many sorts of behavior. By wave motions I refer to the tendency of strength or weakness to come at reasonably regular time intervals. If, in any series of figures, there is a tendency for strength, let us say, to recur with a beat, and if this tendency is so definite and has repeated so many times that it cannot reasonably be the result of chance, we have facts, just like those given above relative to ups and downs or to runs, that are useful in understanding behavior and in forejudging the future.

Facts of These Sorts Universally Available

Facts of all these sorts can be obtained about almost anything that interests you. The Florida orange crop, the birth dates of babies, the incidence of disease, the price of eggs, the number of international battles, the decolletage of women's dresses. Such facts are *very* useful for those who need to have opinions in regard to what is ahead.

Opinions

Now let me discuss the matter of *opinions*. You will notice that one fact given above gives you odds of 1.2 to 1 for a rise in the stock market, 1958 vs. 1957; another fact given above gives you odds of 2.4 for a *decline* 1958 vs. 1957. Both are facts. There are *many other facts* that also have bearing on the present situation. Some of them are 'plus facts,' some are 'minus facts.' Some of them are *internal* behavioristic facts of the sort I have I have been giving you, others have to do with situations *external* to the market.

If you combine *all* available facts and balance *all* the plus facts against *all* the minus facts you will come up with an opinion. This WE do not do! This is YOUR job!

Three Reasons Why We Do Not Give Opinions

There are three reasons why we do not express opinions.

We Don't Know Enough

First, the Foundation has no one on its staff who knows enough about price or production behavior to make his opinion on these subjects worth very much. We have no stock market expert, no cotton price expert, no wheat price expert, no coffee price expert, no geopolitician.

I know a stock price expert in New York. He has *opinions*. I suspect he is competent. At all events he charges $5,000 a year for his opinions. That gives you some idea of what good opinions in this field are worth. He makes forecasts. If you want someone to give you *opinions,* and to make *forecasts* for you, go to an expert and pay the price.

Incidentally, this man is a member of the Foundation. I suspect that the *facts* we produce (for $10) enter into the *opinions* he produces (for $5,000). His opinions are worth more than our facts because he bases his opinions on *many* facts, of which our facts are only a part. An artist can take a dollar tube of yellow paint, a dollar tube of blue paint, and a dollar tube of red paint and come up with a $1,000 picture. You might liken us to the dollar tube of yellow paint. Granted that the tube may not be worth any more, the artist would have the heck of a time to paint his $1,000 sunset without it! That's the way I feel about the facts with which we supply you. They are *indispensible ingredients* for good forecasting. (Incidentally, I think they are worth *much* more than our membership dues.) These facts are *not,* however, good as they are, to be taken *by themselves,* as forecasts.

To Avoid Embarassment

The second reason why we do not express opinions is that we do not wish to subject the members of our committee to criticism or embarassment. I suppose even the expert I spoke of above makes mistakes, Therefore, even if he were on our staff I would not broadcast his forecasts. Once in ten times he might be wrong. That one time would embarass our committee members.

It Isn't Our Business

The third reason we do not express opinions is because *it is not our business to do so.* We are concerned with something quite different. We leave opinions about the ups and downs of business and prices to the experts, the brokers, the fortune tellers, the tea leaf readers, the tipsters, the forecasters, the sellers of services. Our business is something far different—and vastly more important.

It is time I discussed what our business is.

What Our Business Is:

We deal with facts of behavior, but only with one particular sort of fact. We limit ourselves to facts regarding the tendency of many sorts of event to repeat with *rhythm*—that is, at reasonably regular time intervals. Believe it or not, there *are* such tendencies. They *do* continue. They *are* of value in throwing light upon the future. However, these tendencies, like the other facts I gave you for illustration, are merely *tools* that you can use to help you to form opinions. By themselves they are not opinions—they are not forecasts. (But they are indispensable as components of forecasts.)

Why We Study This Particular Sort of Fact.

Why do we study this particular sort of fact? There are two reasons: One, the immediate practical importance of knowledge of this sort in throwing light upon what is ahead. Two, the suspicion that many behaviors of this sort are the result of hidden forces abroad in the Universe—forces of vital importance in the destiny of mankind—forces which, if not studied in this way, might never be understood and mastered.

Facts of Immediate Practical Importance

So much depends upon the light we can throw upon the future! This is true for us in our own individual lives. It is true for us as a nation. It is true for the world.

If we know what's ahead we can often avert it. If not, we can protect ourselves against it—or adapt ourselves to it. (Samuel Crothers once said that adaptability was the greatest ability! Of course he is right.)

Imagine the advantages of knowing the future of the weather, the future of prices, the future of business activity, the future of war! These are some of the tantalizing vistas opened up by the study of rhythmic cycles.

Facts of Underlying Importance

Intriguing and fascinating as these vistas are, I do not think they would have kept me working for the Foundation without salary if it were not for the fact that rhythmic cycles suggest the existence of hitherto unsuspected environmental forces that are all-important in human affairs.

A Mystery Here

There is a mystery here that needs to be cleared up. *Why* do things fluctuate rhythmically?

Chance?

Is it mere chance? In some instances, undoubtedly yes. That is one reason why rhythmic cycles need to be studied and recorded. If they are chance they won't ordinarily continue after discovery. If they don't continue, it can be assumed that they *are* chance. Then they can be disregarded henceforth.

Dynamic Cycles

If the cycle has continued after discovery, or has repeated so many times and so regularly that it cannot reasonably be the result of chance, then what? Well, it could be *dynamic.* That is, the result of action and reaction within the system itself.

For example: Cats eat rats. Put some cats and some rats into a big field. The cats will eat so many rats that they, the cats, will not have much food left. The cats will then mostly die of starvation. With fewer cats the rats will have a chance and will multiply. With more food the cat population will pick up. And so on, up and down alternately, indefinitely. (That's the idea, anyway!)

So also with production, prices, and what have you.

Insofar as these rhythmic fluctuations are dynamic, they are the province of the branches of science concerned, economics, 'catology,' 'ratology,' etc.

We exist therefore *only* because of two reasons: (a) rhythmic cycles of seemingly the same wave length exist in the phenomena of various different branches of science, and (b) there are reasons for believing that certain rhythmic cycles cannot be chance or dynamic even when other cycles of the same wave length in other branches of science have not yet been discovered.

Forced Cycles

These are the reasons that some of the rhythmic cycles cannot reasonably be merely dynamic; reasons why we can assume they are forced: (a) They have repeated regularly too many times. (b) They have repeated regularly over too long a period. (c) They resume after distortion, *in step* with the old pattern. (d) Their wave lengths seem to be related to each other. (e) Cycles of seemingly the same wave length are found in unrelated phenomena, thus suggesting a possible underlying common cause. (f) Cycles of seemingly the same wave length are found both on the sun and on earth. (g) Insofar as the matter has been studied, cycles of the same wave length crest later and later as they are found from either pole toward the equator.

Why?

Why are all these various things so? We don't yet know the answers to *any* of these questions. That is why I say there is a mystery here that needs to be cleared up. When it is cleared up and we know the laws governing cyclic behavior, man will have a much better understanding of himself and the world in which he lives.

Associate Editors

The response to my request for associate editors has been most gratifying. About 30 people have volunteered to assist, one member went so far as to offer to edit, print, and mail Cycles, all in one fell swoop! (We may let him.)

Of course having associate editors has its problems. We have to select a workable number. Then we have to select suitable material for each editor to work on; charge it out to him; mail it; follow up; edit what he writes; get the material back, etc., etc.

All this wealth of assistance reminds me a little of the story of the old time government employee during the last war. 'Everything,' he said 'moves so much slower since the emergency!' I could paraphrase to say, 'Everything is so much harder since we have help!' However, it will all work out in the end.

My South-East Trip

If you live in Virginia, North or South Carolina, Georgia, or Florida (except in the Miami area) and if you did not get a visit or a phone call from me it is probably because (a) I couldn't manage to pass through your town either going to Miami or coming back; (b) passed through it at such an unreasonable hour that I did not feel I should call; (c) couldn't find you in the phone book; (d) no one answered the phone. As for the Miami area, all members within these limits were invited to attend the meeting on February 19th so that I could meet them personally and so that they could meet each other.

I can't say I had any time to get a sunburn but in other ways I got a great deal from the trip. I hope the members with whom I visited got something too.

* * * * *

Are We Headed For A Big Depression?

I am being asked "Is the present business set-back going to be a minor one like those of 1936-37, 1948-49, 1951-52, and 1953-54, or will it be a major one like that of 1929-32?"

I shall give you, in an early issue, some facts that have a bearing on this question.

Cordially yours,

Edward R. Dewey

Director

Cover Design Contest!

Several people have suggested that we print the table of contents on the outside front cover. This change would necessitate a new cover design.

We could put the contents in (a) a white or (b) light blue "box," or (c) vignette it or (d) could change the color of the entire cover to a tint (light grey-blue?) against which small printing would show.

We could (a) move our present "art" around or (b) we could have an entirely new cover.

Let's have a cover design contest! Five dollars to the winner.

E. R. D.

Research by Staff

A PROJECTION TO 1990 OF 11 STOCK PRICE CYCLES AND THE UNDERLYING GROWTH TREND

BY EDWARD R. DEWEY

In 1944 (fourteen years ago) a brokerage firm in New York hired me to make a cycle analysis of stock prices; and to combine the cycles and project them into the future. I did this, using the annual figures of the Standard & Poor's Corporation's Combined Index (now 500 stocks) through 1943.

Gains 185 Times Losses

If you had acted on the basis of the projection made at that time your gain to date on completed transactions would have been 185 times your losses. You would be short at the present time. You would be planning to cover in 1960. Of course no one yet knows whether or not the current transaction will prove to be profitable, but in general the projection has worked pretty well.

Ten cycles were isolated at that time, all of them over four years long. In the years 1956 and 1957 I re-examined the 1944 work and revised certain wave lengths as shown in the table below. I also isolated one more cycle (27 years long) and revised the underlying growth trend.

Broken Lines Show Cycles And Trend

The broken line in Fig. 1 on the following page shows the combination of all these 11 cycles and the underlying growth trend, recomputed on the new base (1941-43 = 10), 1871 through 1990. The solid line shows actual prices 1871 through 1957.

Here is the table showing the wave lengths of the 11 cycles as originally determined and as revised in 1956 and 1957. The table also shows the strength of each cycle and the date of the nearest ideal top.

Original Length	Revised Length	Typical Strength**	Time of Ideal Top
4.89	*4.89	3.5%	1959.30
5.50	*5.50	7.0%	1958.00
6.07	5.91	6.4%	1958.69
6.86	*6.86	8.3%	1957.40
8.17	8.17	4.7%	1954.16
9.2	9.18	17.1%	1955.66
11.0	*11.0	3.8%	1952.50
12.0	12.8	10.9%	1953.90
14.5	*14.5	12.25%	1957.50
21.0	22.0	21.6%	1952.60
-	27.0	14.3%	1956.50

---

*NOT YET AUDITED. THE LENGTH AS DETERMINED IN 1944 IS STILL BEING USED.

**STRENGTH IS SHOWN IN PERCENT ABOVE AXIS AT TIME OF IDEAL TOP.

The revision of cycle length moved the projected crest forward from 1954 to 1956 but made no change in the date for the next low, still set at 1960.

Comparison of the actual prices with the synthesis of the 11 cycles and the trend from 1871 to date shows some areas of disagreement that should not be ignored. On the whole, however, there is considerable agreement between the two curves.

The Projection

The projection of the cycles and the trend gives some idea of what may happen from 1958 through 1990 if the cycles have been correctly determined, and if they continue. Bear in mind however that there have been divergencies in the past between the synthesis and the actual and, even most optimistically, there will be more in the future.

The Rôle of Opinion

The purchase and sale of securities should be based upon *opinion*. Opinion in turn should be based upon *facts*. Facts about the rhythmic cycles in stock prices are perhaps the most important sort of fact to take into account in forming your opinion, but remember that they are but one sort of fact. To be a successful stock market operator you need many other sorts of fact, and judgement, too!

Limitation of Cycle Knowledge

Some of the limitations of cycle knowledge are as follows:

1. Some of the observed cycles may have been present as a result of random forces rather than cyclic forces. Clearly, if cycles are present as a result of random forces they cannot be expected to continue.
2. Even significant cycles (that is to say cycles present as the result of cyclic forces) may, because of a compound nature, fade out in the course of time.
3. The projection being discussed did not include any cycles less than 4.89 years in length. There are without question shorter cycles in this series of figures. Their influence might advance or retard the turning points from the time indicated.
4. There may be other as yet undiscovered longer cycles in this series of figures. These additional longer cycles might also modify the time of any turning points.
5. It is unreasonable to imagine that *all* the ups and downs of the stock market are due to cyclic forces. Random factors undoubtedly play an important part. The projection, by its very nature, cannot take these random factors into account.

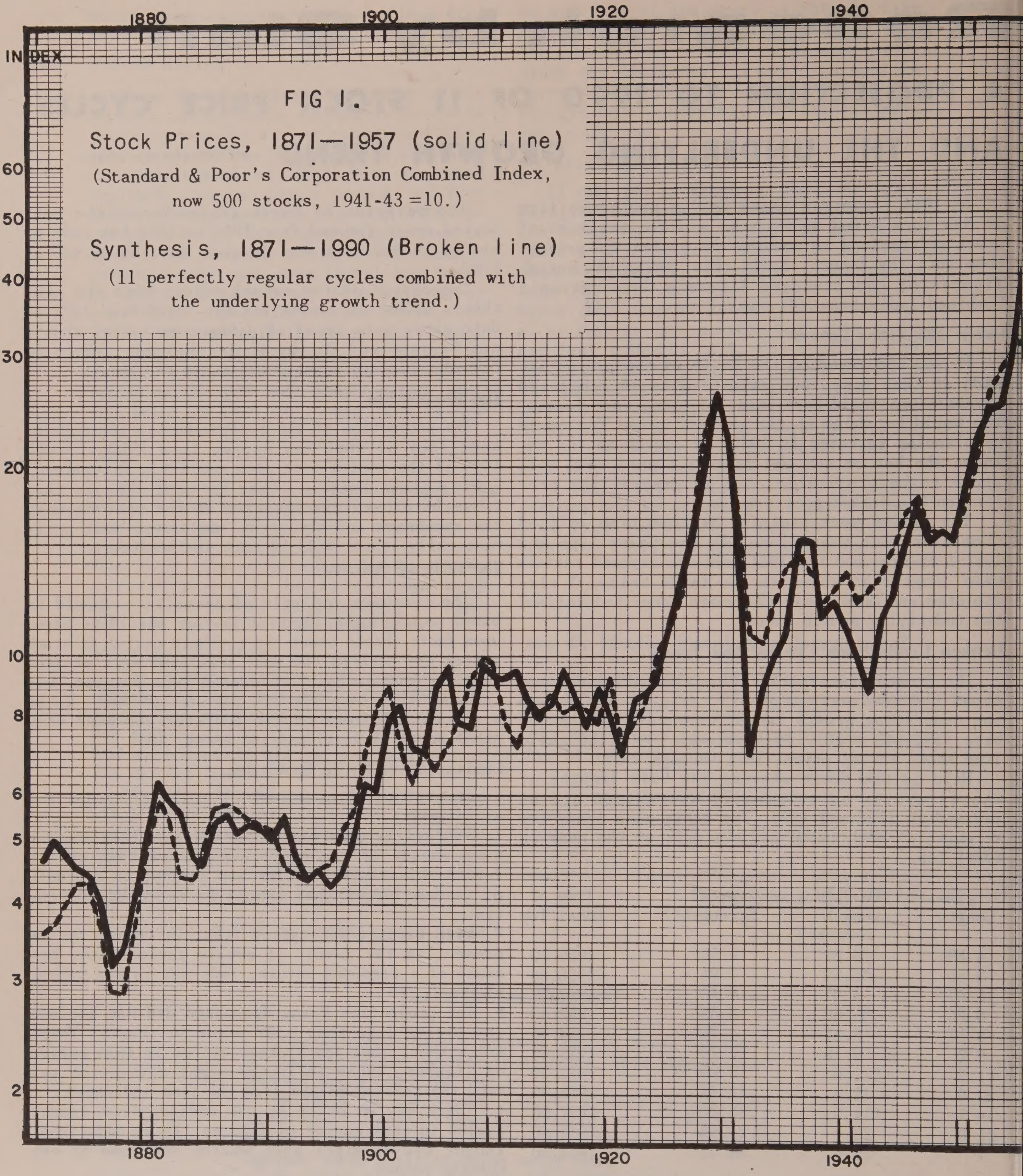
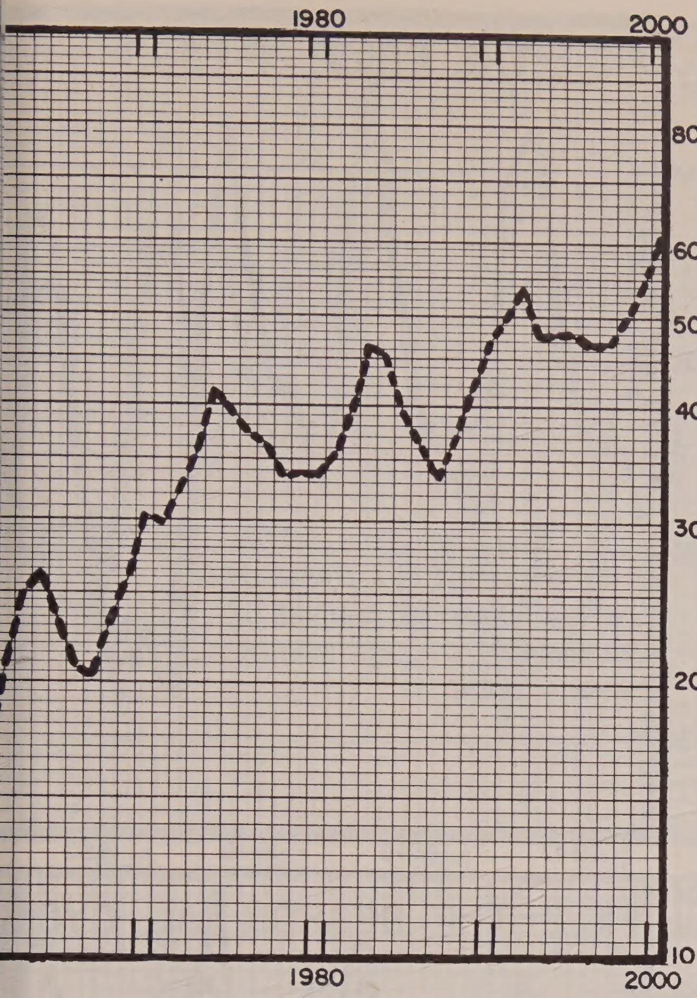


FIG I.

Stock Prices, 1871—1957 (solid line)
(Standard & Poor's Corporation Combined Index, now 500 stocks, 1941-43 =10.)

Synthesis, 1871—1990 (Broken line)
(11 perfectly regular cycles combined with the underlying growth trend.)



6. In some instances the true cycle length may be a little longer or shorter than as determined. Also the strength may be a little greater or a little less. Note that errors of length are cumulative. An error of half a year in the length of a cycle will throw that particular cycle out two full years in four repetitions of the cycle.
7. A comparison of the combination of all 11 cycles and trend with the actuals (Fig. 1) shows many divergencies. These divergencies are the result of random factors, shorter cycles, other longer cycles, incorrect cycle determination, etc. It is unreasonable to expect that there will be no divergencies in the future.
8, Finally, it is the simplest of all mathematical tricks to reproduce any time series, such as Fig. 1, to any degree of accuracy you wish by combining *enough* perfectly regular cycles of well defined properties.

Not Too Impressed

That is why in 1944, even though the combination of the ten cycles and trend fairly well corresponded to the actual values I was not too impressed with the result. Neither was the New York financial house for which I did the work. I put it away and forgot all about it. Then one day, in 1951 I think, I happened to come across it. I compared the projection with actual behavior from 1943 forward. I was highly gratified.

Arguments in Favor

The arguments in *favor* of reliance on projections of this sort are as follows.
1. Cycles *do* keep on operating after discovery. Cycle forecasts do come true. Remember Samuel Benner's pig iron price forecast which came true over a *60 year period* with a gain-loss ratio of 45 to 1? And many others that could be named.

If the rhythms are significant they can be expected to continue. (Being "significant" means that they are the result of periodic forces, not the result of random forces which just happened to occur at rhythmic intervals.)
2. The discovered cycles really were present in the figures from 1871 to 1943 or 1956 or 1957, as the case may be. Moreover each of them repeated rhythmically over that period of time.
3. Many of the discovered cycles are well known and have been found over much longer periods of time in other series of figures.
4. Granted that the excellence of the comparison 1944—1957 is partly a matter of luck, it is impossible to believe that the general configuration of the two curves is *all* a matter of luck. The evidence suggests that at least some of the isolated cycles must be continuing, and that the lengths and strengths and timing of these cycles must have been determined with pretty fair accuracy. That is, the success over a 14 year period of a projection made early in 1944 definitely suggests that the work has merit.

Conclusion

Let us now try to cast a balance:

The projection made in 1944, having worked for 14 years, cannot properly be ignored. This projection says in essence that a substantial decline is due. None of the revisions in 1956 or 1957 change this fact. This much I think we can and should accept.

It is quite possible—even probable—that the projection will continue to "work" and that a short sale of the Combined Index made at average prices for 1956 can later be covered at a profit, though I do not think the particular year of 1960, picked as the next year of low, is anything to bank on, nor do I take too much stock in the extent of the decline indicated.

As for 1960 being *the* year of low, it would be surprising and a matter of pure luck if it should turn out so. You simply cannot ignore all cycles under 4.89 years and hope to hit the target on the button every time.

I think this projection can give you useful and valuable orientation. Do not abuse the results of my work by trying to make it do things it is not designed to do. Do use it within the limits of its usefulness, and profit!

WHAT'S AHEAD FOR EGG PRICES?

The price of eggs over the next year should continue to slide downward to a low in early 1959—if the cycles we have so far isolated in this series continue to be as dominant in the future as they have been in the past, and if the level of trend we are using is correct.

The short term fluctuations in the price of eggs since 1947 have been influenced by at least two cycles. These are the seasonal or 12-month cycle, and a 26.5-month cycle.

The Synthesis

According to the synthesis the 1958 seasonal high price of eggs will be below the high of 1957. This is because the 26.5-month cycle is on the way down to a bottom. The 1959 seasonal peak will be higher than the 1958 peak because the 26.5-month cycle will have rounded a bottom and be on the way up again toward a peak. See Fig. 1.

This assumes that the cycles continue to operate in the future as they have in the past.

The Seasonal Cycle

Fig. 2 diagrams the seasonal pattern of the price of eggs by means of a broken line. This pattern, of course, repeats year after year.

Expressed as a percentage of trend the seasonal pattern is as follows:

Month	% of Yearly Trend	Month	% of Yearly Trend
January	89.74	July	100.0
February	89.95	August	107.4
March	91.20	September	119.7
April	90.99	October	122.2
May	87.30	November	116.7
June	90.99	December	102.1

The 26.5-Month Cycle

Fig. 3 shows the actual and ideal 26.5-month cycle.

The average length of the cycle over the period for which we do have data is 26.5-months. The average amplitude of the cycle has been 117.2% of trend at time of crest, and 85.3% of trend at time of trough.

This cycle has an ideal high at February, 1958, the next low is at March, 1959.

Remember that the two cycles just partly describe the past fluctuations in egg prices. But the synthesis corresponds so well to actual egg prices in the past that it is worth watching in the future.

When time permits egg prices prior to 1947 will be studied. If this cycle is present in the earlier figures it can be relied upon with greater confidence.

G. Shirk

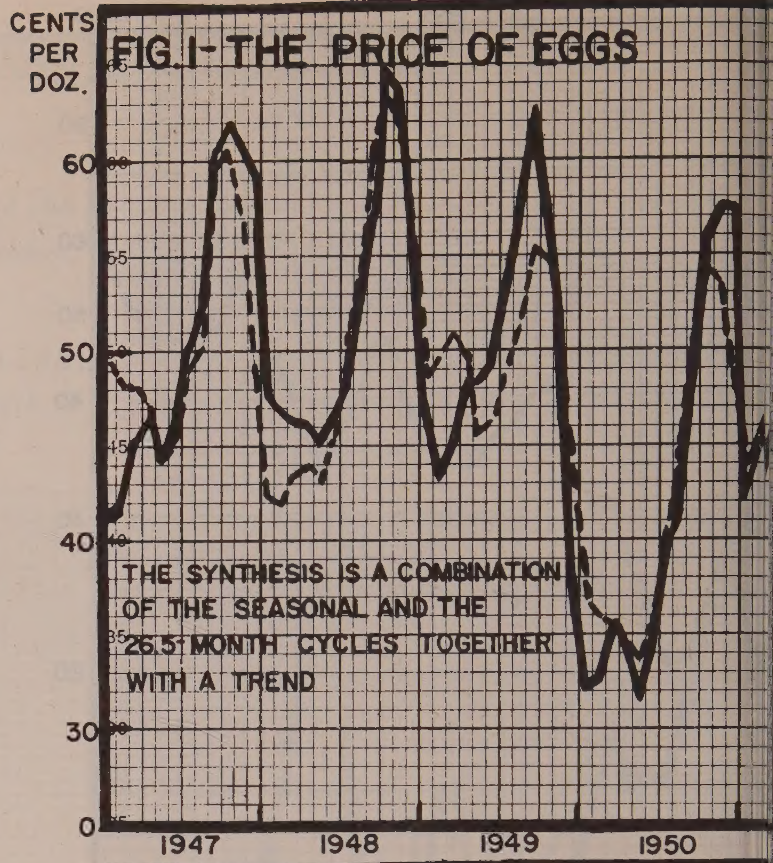


FIG.1 - THE PRICE OF EGGS

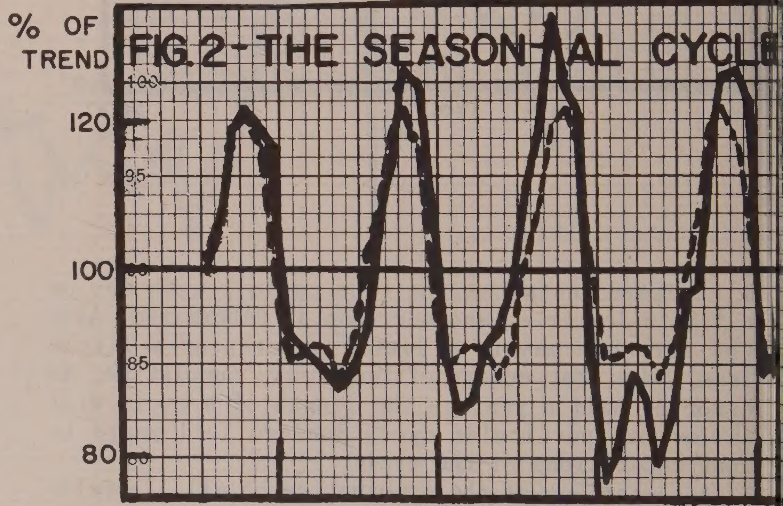


FIG.2 - THE SEASONAL CYCLE

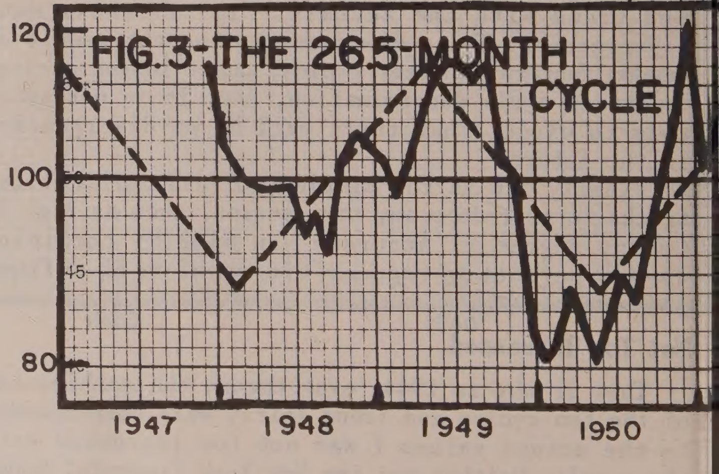
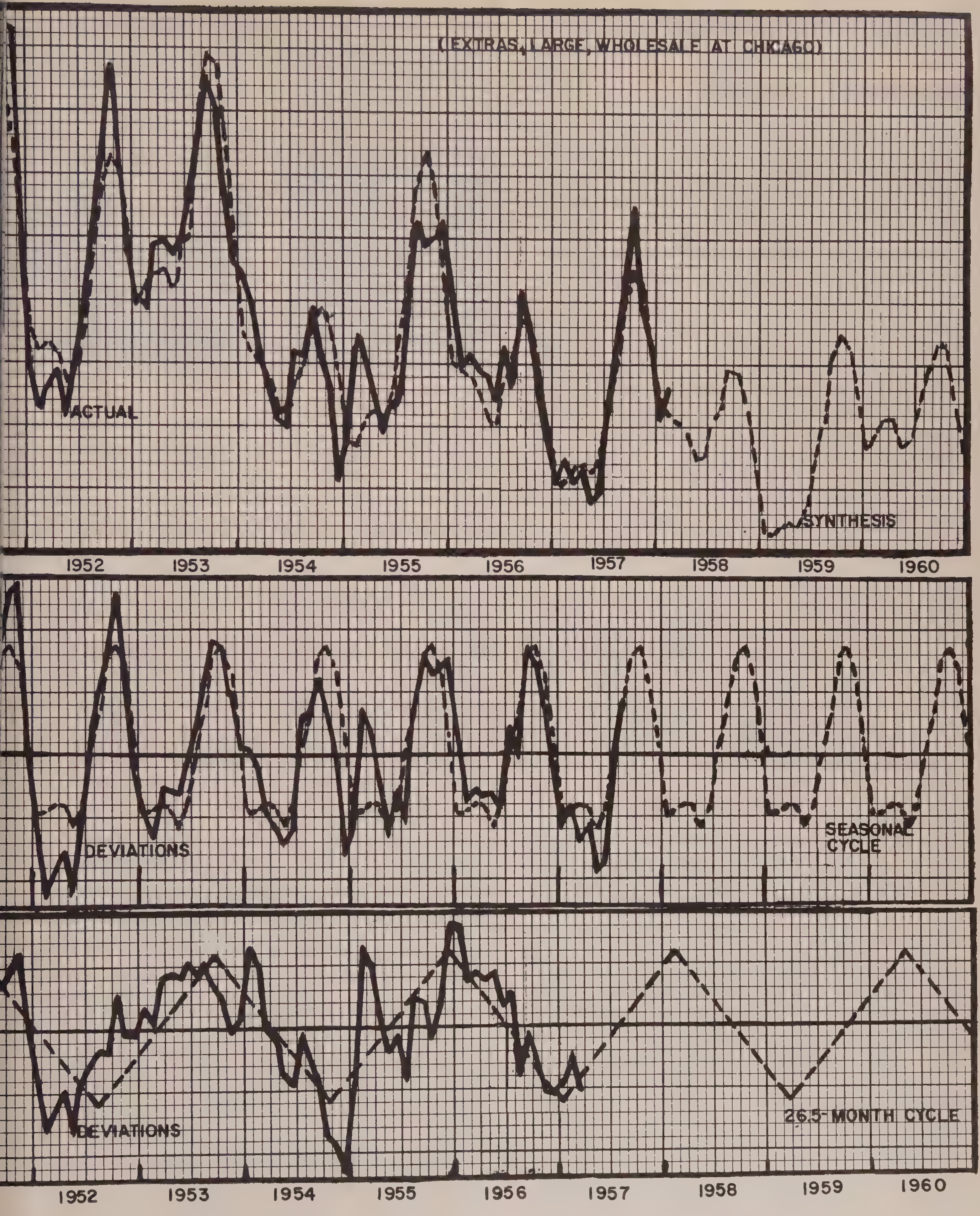


FIG.3 - THE 26.5-MONTH CYCLE


(EXTRAS, LARGE, WHOLESALE AT CHICAGO)
ACTUAL
SYNTHESIS
1952
1953
1954
1955
1956
1957
1958
1959
1960
DEVIATIONS
SEASONAL CYCLE
DEVIATIONS
26.5-MONTH CYCLE
1952
1953
1954
1955
1956
1957
1958
1959
1960

Research by Others

VARIABLE STARS*

BY WILLIAM T. SKILLING AND ROBERT S. RICHARDSON

We are so accustomed to thinking of the sun as an unchanging source of light and heat that we naturally think of the stars as being equally constant. But there are several thousands of stars that are known to be variable. Some of these are many times brighter at maximum than at minimum; others drop only a little from their full radiation.

Kinds of Variables

E. C. Pickering of Harvard classified variable stars into five groups as follows: Eclipsing variables; Long-period variables; New stars (novae) or temporary stars; Irregular variables; and Cepheid variables.

Eclipsing Variables

Eclipsing variables are not true variable stars since they undergo light changes only when a companion star passes between them and the earth, as the sun's light is cut off by the moon at the time of a solar eclipse. The star itself remains unchanged. Eclipsing variables do not concern us here.

Long Period Variables

Long-period variables, like the irregular variables, are red, giant stars (Fig. 244 and 245). Their periods are only approximately regular. A well-known example of this class is Mira, "The Wonderful," so named about 300 years ago, when its period of fluctuation was first discovered. Previously it had been catalogued merely as Omicron Ceti. During an average period of 330 days—sometimes nearly a month more or less—it changes from a brightness nearly equal to that of the Pole Star to a dimness far below naked-eye observation.

Novae

Novae or new stars are those which suddenly flare up to great brilliance and then subside with irregular changes in brightness. They are not usually spoken of as variables.

Irregular Variables

Irregular variables change from time to time by different amounts and at different intervals. Their behavior is entirely unpredictable. They are red stars; the great red star Betelgeuse, in Orion, is one of these irregularly fluctuating stars. Whether for some unknown cause more heat and light are developed from time to time or whether some of the light is cut off by intercepting nebulous matter, no one knows.

Cepheid Variables

Cepheid variables, the short-period variety of variable stars known as Cepheids, are among the most interesting of the stars of changing brightness. They take their name from Delta Cephei, an early known variable with a period of 5.37 days (Fig. 246). Cepheids have periods ranging from a few hours to about 50 days.

Cepheid variable stars are often divided into two classes; one with a period of about ½ day, the other with a period of several days—usually about a week (Fig. 247). On account of the fact that those with a period of about half a day are numerous in globular clusters, they are called *cluster variables*. They are not confined exclusively to clusters, but occur in all parts of the sky in smaller numbers.

A marked peculiarity of cluster variables is that they are all of almost exactly the same degree of brightness. Shapley estimates their absolute magnitude as zero. This is very bright, but not nearly so bright as the typical Cepheids, whose periods are measured in days instead of in hours. Shapley uses the cluster variables as a means of finding the distances of the globular clusters, which are far too remote to be measured directly. By observing the very faint *apparent* magnitude of the cluster variables in any one cluster, and comparing that with their high absolute magnitude, he computes the parallax of the cluster.

Typical Cepheid variables. A most remarkable circumstance makes these stars of one or several days' period the most valuable in the sky to the astronomer who wants to measure exceptionally great distances. There is a relationship between their periods and their absolute magnitudes. The longer the period the brighter the star. All are very bright, but those with a period of about one day are 100 times as luminous as the sun; those with a 10-day period are 1000 times brighter than the sun.

Discovery. In 1912 Henrietta Leavitt, of Harvard Observatory, while studying plates taken of the Smaller Magellanic Cloud, found about 100 variable stars in the cloud. She noticed that the brighter the star the greater was the time required for it to go through its period of change from one maximum of brightness to the next. She announced the relationship between period and brightness. Knowing that the stars of the cloud were all at about the same distance she saw that the period must depend upon the *absolute* magnitude.

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THE TEXT OF THIS ARTICLE IS A SECTION OF THE BOOK, SLIGHTLY REARRANGED, AND EDITED TO OMIT CROSS REFERENCES, ETC.

ASTRONOMY IS A GOOD TEXT BOOK AND WORTH THE PRICE ($6.00) IF YOU ARE INTERESTED IN THE SUBJECT. YOU CAN GET IT FROM OR THROUGH YOUR LOCAL BOOK STORE.

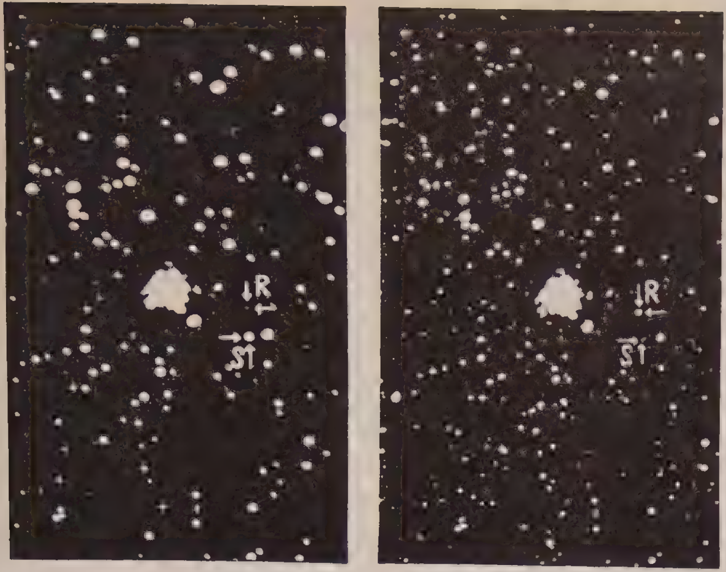


FIG. 244. TWO VARIABLE STARS, R AND S SCORPII, SHOWN BY ARROWS. THE TWO PICTURES, TAKEN ABOUT TWO MONTHS APART, SHOW THESE LONG-PERIOD VARIABLES WHEN NEAR MAXIMUM AND WHEN NEAR MINIMUM. THE BRIGHT SPOT AT THE LEFT OF THE VARIABLES IS THE GLOBULAR STAR CLUSTER M 80. (YERKES OBSERVATORY.)

The large bright stars had slower action, somewhat as a long pendulum vibrates more slowly.

Actual distances and luminosities of Cepheids determined. When Miss Leavitt had pointed out a method of determining *relative* brightness from the period it became at once known that if the distance and hence the actual luminosity, of any *one* Cepheid could be determined luminosities and distances to others could be computed from their periods.

Unfortunately there are no Cepheids near enough so that their distances may be reliably measured by direct means; the nearest is at a distance of about 200 light years. Indirect means must be resorted to.

First, Hertzsprung, in 1913, made a determination of the *average* distance (and from that the average luminosity) of 13 Cepheids in the stellar system. Other distances could then be derived by comparison of periods.

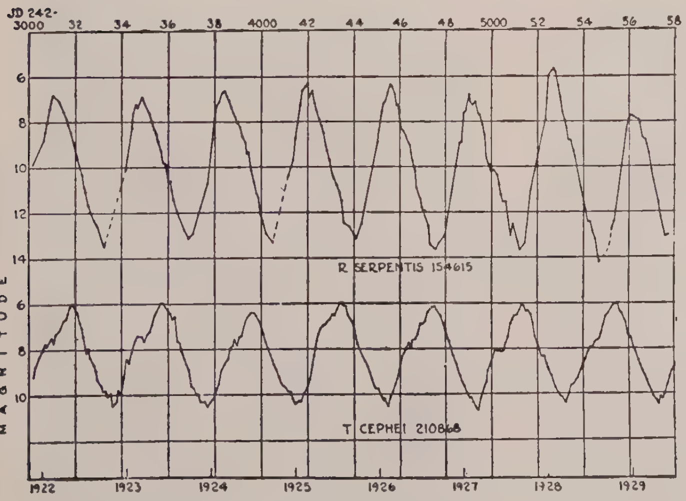


FIG. 245. LIGHT CURVES OF TWO LONG-PERIOD RED GIANT STARS. PERIOD OF R SERPENTIS 357.2 DAYS, OF T CEPHEI 387 DAYS. (PAUL W. MERRILL, MOUNT WILSON OBSERVATORY.)

The period-luminosity curve. Five years after Hertzsprung's measurements Shapley recalculated the average distance to several Cepheids, and from his revised figures constructed a curve such as the one shown in Figure 248. From this curve the actual luminosity of any Cepheid whose period is known can be found. From the luminosity its parallax can be computed.

Several observatories, notably Harvard, McCormick and Mount Wilson, have cooperated in this difficult and important work of determining relation between period and luminosity of a Cepheid. It is thought that any further revision will be of minor importance. Thus the zero point has been fixed upon the scale which at first gave only *relative* distances. Hubble has used Cepheid variables of the extragalacgic nebulae in measuring distances to these most remote of all objects.

Cause of Cepheid variation. At first Cepheids were classed with eclipsing variables. The spectroscope shows a Doppler effect due to approach and recession, as is shown in the eclipsing stars. But in case of Cepheids the star is brightest when the approach is most rapid, and dimmest when recession is most rapid. This cannot be due to motions causing an eclipse.

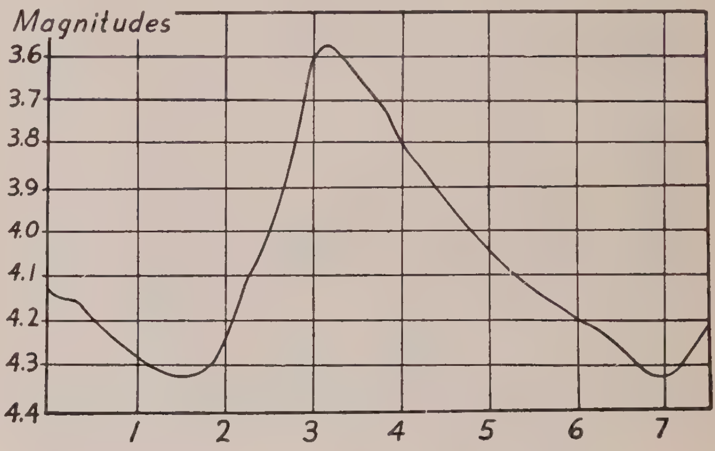


FIG. 246. LIGHT CURVE OF DELTA CEPHEI.

Several theories have been proposed to explain the motion and the change in brightness. The most widely accepted of these is the pulsation theory, suggested by Shapley. The gaseous star is supposed to be alternately expanding and contracting. The motion has been likened to the beating of a heart. As it expands it becomes brighter, and the spectroscope shows approach. As it contracts to smaller size the star gives less light, and naturally the Doppler effect is one of recession. Although there is no positive proof of the theory of pulsation it seems to explain very satisfactorily the changing brightness of these stars.

Mechanism of pulsation. Eddington has shown by a mathematical discussion of the subject that if a gaseous star should in some way be compressed to smaller size or expanded to larger size, it would tend to spring back into its position of equilibrium Like a swinging pendulum or the balance wheel of a watch, the star would pass its equilibrium point, and so continue to vibrate back and forth at some regular rate of pulsation.

The star would continue this motion for a long time for there is very little retarding effect of any kind, such as the friction that finally checks a pendulum. The star's gravitation drawing the gases in, and the elasticity of the gases pushing them out, are the two forces operating in this process.

Changes in the star. During the expansion and contraction of these stars the diameter may change as much as 10 or 15 percent. Contraction raises the star's inner temperature; expansion lowers the inner temperature. The range of temperature may be as great as a thousand degrees. Then following a time lag (which is not well understood), the color and spectral type go through changes that correspond to the changing temperature.

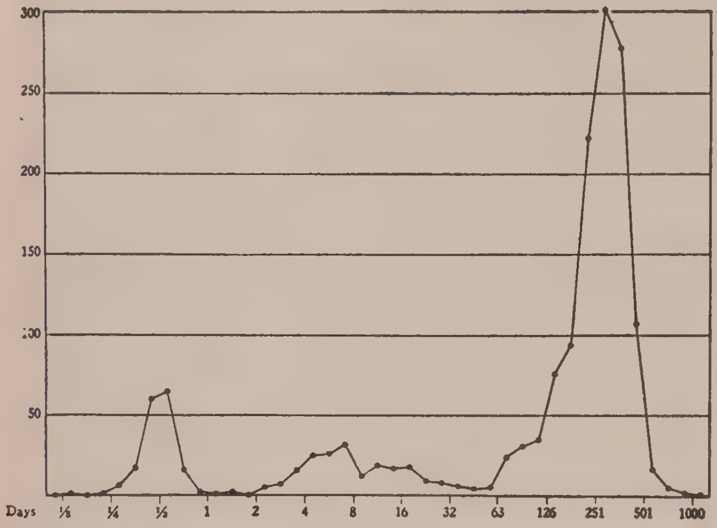


FIG. 247. FREQUENCY CURVE OF THE PERIODS OF VARIABLES. NOTICE THAT THE MOST USUAL PERIODS ARE ½ DAY, 7 DAYS, AND 250 DAYS. (PAUL W. MERRILL, MOUNT WILSON OBSERVATORY.)

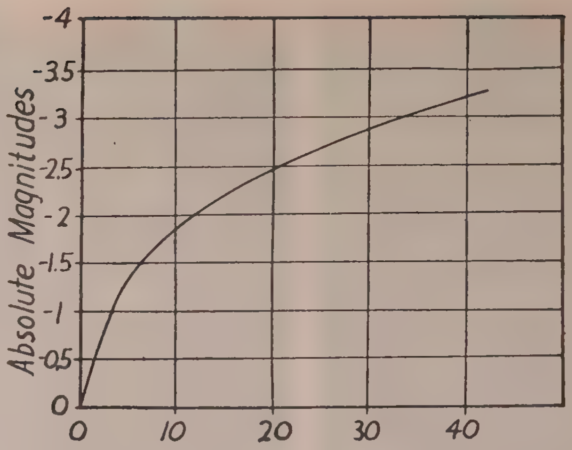


FIG. 248. THE PERIOD-LUMINOSITY CURVE OF CEPHEID VARIABLES. IF ANY STAR IN THE CURVE IS PLACED AT A POINT DIRECTLY ABOVE ITS OBSERVED PERIOD, ITS LUMINOSITY CAN BE FOUND DIRECTLY AT THE LEFT OF THIS POINT.

Most of the Cepheids are very distant, and therefore faint. For this reason the spectra of only 29 of the brighter ones (to about eighth magnitude) had been well recorded until Joy, of Mt. Wilson Observatory, using a very powerful spectrograph, increased the number of spectra to 155. Giant stars so distant as to have magnitudes as low as thirteenth or fourteenth were reached. Knowledge of this remarkably instructive variety of stars has thus been greatly extended.

AN 11-YEAR CYCLE IN CROP YIELDS

William W. Morris, in an unpublished manuscript in the library of the Foundation called "Sunspots and Crop Production" asserts that crop yields in Wisconsin, 1866—1946, are associated with sunspot numbers. Oats, wheat, barley, tame hay, and potato yields have, on the average, peaks that are more or less in step with the 11-year sunspot cycle. Corn, tobacco, and rye yields are, on the average, down in relation to the sunspot curve.

Morris finds that his curves are similar whether they are made for certain individual regions of the state or for the state as a whole, thus indicating that the yield variation is due to some general force influencing the entire state.

The differences of yield are important. Morris finds that the yield of corn, for example, varies from 38.1 bushels per acre during the period of sunspot decrease and minima to 28.7 bushels per acre during the four or five years of sunspot increase and maxima. This difference of nearly 10 bushels per acre amounts to an increase of about one third, on the average, for the periods of greater productivity.

Morris believes that the mechanism of association is through a solar effect upon temperature and rainfall.

Morris' paper is open to criticism on a number of technical grounds. It is, nevertheless, most suggestive.

Letters to the Editor

SHORT STOCK MARKET CYCLES

Dear Sir:

The December 1957 Bulletin of *Cycles* was particularly interesting to me because of the large amount of new data on stock market cycles. I was particularly interested in the short-term cycles reported by Robert Edwards. I have long suspected a faint connection between the phases of the moon and the short-term trend of the market, although the mere mention of it will bring ridicule from my friends. I have always had a shade of hopefulness each time I noted the new crescent moon in the Western sky and I am glad Mr. Edwards has proven that this is apt to mean about 8 (Calendar) days of improving prices are ahead. This would mean 5 or 6 up-trend Market sessions eliminating week ends and holidays. I would point out, however, that the extent of the rise from this cycle alone would not cover commissions so that your 27% a year and more would go to the broker and the cost of transfer stamps, which would run about 1.6% per round trip or over 40% a year.

One of the short cycles many of us use is about 17 market sessions in length. Its low points are more regular than its tops. It goes back to the time of Saturday sessions and some call it the cycle of 84 hour bottoms, which divided by 5 gives roughly 17 days. (We usually consider the period from 2 P.M. to the close as 1 hour as the D. J. hourly averages are reported that way.) Since we know that the market usually takes about twice as long to advance as to decline - perhaps because the emotion of hope operates more slowly than that of fear - I allow 10 or 11 days for the advancing part of the 17 day cycle leaving 6 or 7 for the down part.

There also seems to be a 17 week cycle which I divide into two segments the same way. Old timers used to call this the cycle of 84 day tops. Allowing for one holiday about every 17 weeks this is close enough. You might be interested to fit both of these cycles to actual figures for a given period and I think you will discover that there is sufficient correlation to make them of some practical interest from a trading standpoint.

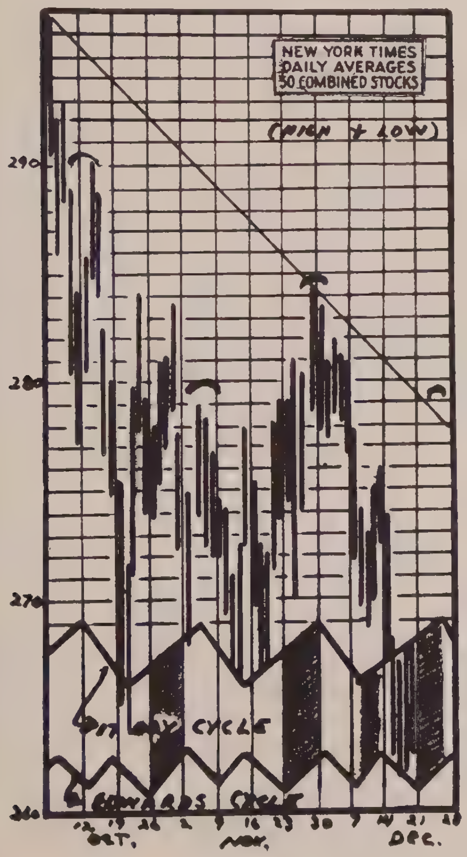
Obviously this 17 market day cycle differs from the lunar cycle of Edwards but it is of interest to superimpose one on the other and note that when both Edwards and the 17 day cycle are in the same phase (both advancing or both declining) there is a much greater chance that the market is moving in that same direction.

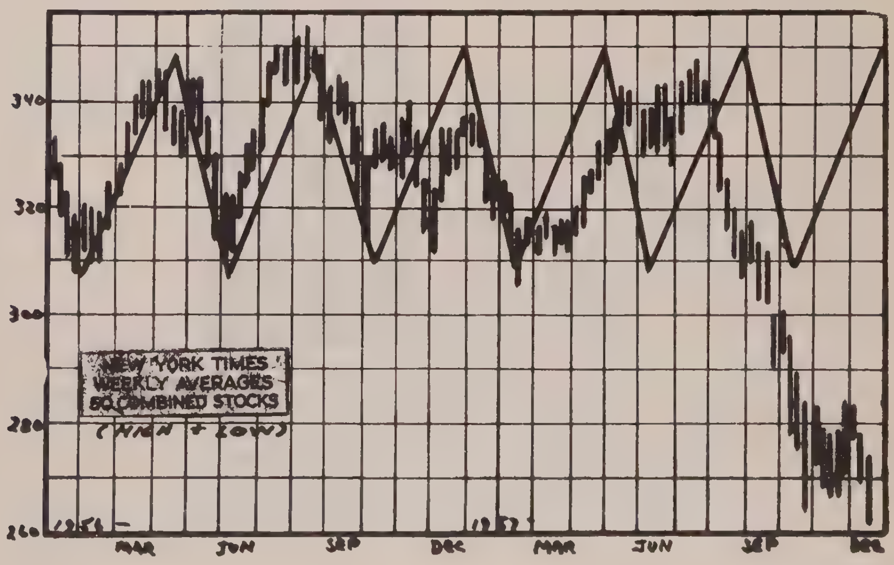
Of course, no one should rely on any one or two cycles in short-term work any more than in longer term studies but when several appear to be in the same phase, they may well have a practical meaning which combined with other studies, both technical and fundamental, will prove profitable.

The enclosed very rough work sheets show how I have been using these cycles currently and the conformity with recent trends does seem rather interesting.

Sincerely yours,
George B. Seager

Hayden Stone & Company
New York, New York





WANT NONE OF IT

Dear Mr. Dewey:

Thank you for your letter. I have read with interest the bulletin on *Cycles*, which you enclosed.

It would seem to me that your thesis is as follows: Because cycles exist in nature (natural acts), the study of such should lead to a forecasting of human acts (as in business). I say that this is impossible because of the human element existing in man, that is, personality.

This is true today. The present business cycle is little more than a forgery; it is artificial.

Furthermore, cause and effect makes a cycle intelligible. Not as your bulletin concludes. . . .

With this in mind, I cannot consider membership in the Foundation.

Yours truly,
R. J. L.

Bala-Cynwyd, Penna.

INFLATION

Dear Mr. Dewey:

This chapter regarding inflation and the growth of our national debt, which you referred to on pages 119 and 120 of *Cycles*, Volume VIII, would certainly be of great interest right now. Do you propose to release it soon?

I used to do considerable work with indices and cycles but had to give it up, or thought I did. I do not now know the techniques, but when I read over your work I sort of feel that I am back at it again, and it pleases me. I also get a lot out of it.

My immediate interest is how individuals can protect themselves from the financial panic which the politicians are undoubtedly going to bring down upon us. I would like to read your views and work them over a little.

Sincerely yours,
Frederic Arden

Savage, Maryland

In reply I said:

Dear Mr. Arden:

It will be quite a little while before I get to the chapter regarding inflation and the growth of our national debt. There are several more installments of the chapter dealing with growth trend in industry that must be published first.

In a nut shell, my ideas in regard to the national debt are that it will increase at an ever increasing rate and that ultimately—either after the next major war or after the politicians have sought to buy us out of a *major* depression—we will have repudiation.

I should think that direct or indirect ownership in real property would be the best protection against these contingencies.

Every cordially yours,
Director

HURRICANE CYCLES

Dear Mr. Dewey:

As you no doubt well know, meteorological cycles are very indefinite. However, evidence exists of hurricane cycles in New England and in Texas.

An analysis by the Army Corps of Engineers on the basis of known tropical storms from 1829 to 1955 indicates a cycle of roughly 30 to 40 years in length in Texas. The incidence of Texas hurricanes has alternated between one every 9 years during a period of minimum occurence and one every 1.4 years during the period of maximum frequency.

In New England the cycles are approximately 45 years in length, i.e., from the mid-point of one period of maximum frequency to the next mid-point of maximum frequency. The last period of maximum frequency is believed to have ended at the end of 1955. Projecting back to the first known major hurricane in New England which was in 1635, all *major* hurricanes in this area have occurred during the cycle of maximum frequency. During recent years it would appear that minimum periods of hurricane incidence in Texas correspond roughly with maximum period of hurricane incidence in New England.

Very truly yours,
Gordon E. Dunn
Meteorologist in Charge

United States Department of Commerce
Weather Bureau
Miami 32, Florida

DEPRESSIONS GOOD

Dear Mr. Dewey:

I am attaching my check in amount of ten dollars for renewal to subscription to *Cycles*.

I am frank to say that I do not understand what I read. However I am a retired business man, and naturally I like to read about business. To be truthful I have some money and I hope to be spared long enough to get that invested in good U. S. business firms—not at today's prices No-No. After spending over fifty years in business, having seen many busts and booms, the one I see ahead is a dilly, and, it is good for my grandsons. I am one of those guys that think a depression about every four years is good medicine. *Cycles* is good reading.

Very truly yours,
H. A. A.

Lewistown, Montana

In reply I said:

Dear Mr. A.

I enjoyed your letter of December 4 and am glad you find *Cycles* good reading.

I agree with you that a depression every four or five years is good medicine but there are not many who see it that way.

Every cordially yours,
Director

New York Chapter

THE FEBRUARY MEETING

President Jack Dorland called to order the second meeting of the New York Chapter of the Foundation for the Study of Cycles on Wednesday, February 26, 1958 at 6:15 P.M., in a private dining room of the Hotel Alden, 225 Central Park West, New York City. 59 persons were present.

The minutes of the previous meeting were read by the secretary and accepted as read.

Treasurer's Report

Paul H. Halladin, Treasurer, reported the payment of $35.00 in dues to date. He announced, too, that the price of $5.00 for the evening's dinner included a contribution to the Chapter of approximately $.88 per person. A motion was made, seconded and passed that the Treasurer's report be accepted.

Future Speakers

President Dorland informed the membership that Mr. Albert J. Hanak, Manager of Research of a prominent brokerage company, would address the next meeting of the Chapter, to be held on Wednesday, March 19, 1958 at 6:00 P.M. at the Alden Hotel, on the subject, "Cycles in the Stock Market". A tentative schedule of speakers for future meetings included Mr. E. R. Dewey on Cycles in International and Civil War Battles, Dr. Leonard W. Wing on Latitudinal Passage of Cycles, Mr. John Nelson on Planetary Arrangements and their Effects on Radio Transmission, Dr. Sherwin A. Kaufman on Biological Rhythms.

Questions

After extending an invitation to all to become members of the Chapter, President Dorland asked those present to consider the following questions sent in by Mr. Dewey, Director of the Foundation for the Study of Cycles:

1. What subjects other than those already appearing in the Cycles Round-Up Section of the magazine, *Cycles*, should be treated?
2. Should statistical data be included in articles appearing in *Cycles?*
3. Do any Chapter members care to act as contributors to *Cycles*?
4. Would any members with some editorial experience and who could be depended upon for a few lines each month care to serve as Assistant Editors or even as Editor-in-Chief?

Mr. Dorland urged the membership to give serious thought to the list of suggested aims and purposes of the Chapter, which appeared in the February 1958, issue of *Cycles*.

Commander Williams Talk

Lieutenant Commander David Williams, Vice President of the New York Chapter of the Foundation for the Study of Cycles, Manager of Cable Purchases of Consolidated Edison Company, and long time student of cycles in business and finance gave a very interesting and provocative talk on "Commodity Price Cycles". After tracing the history of cycle study, Lieutenant Commander Williams offered an absorbing study of the cycles of the prices of wheat, corn, pig iron and copper. Illustrations projected on a screen accompanied the talk. A question and answer period followed.

Copies of Talk Available

Commander Williams will be happy to supply copies of his talk on request. It is 5 pages long, illustrated by 24 charts. Address him at 4826 - 217th Street, Bayside 64, New York.

The meeting was adjourned at 9:35 P.M.

Respectfully submitted,

H. B.

* * * *

COMMANDER WILLIAMS

David Williams, who addressed our New York Chapter, was born sixty years ago in Leeds, England. He came to this country at the age of seven. He studied electrical engineering at Cooper Union in New York City. He is a Lieutenant Commander in the United States Naval Reserve and served in the military forces of the United States during the Mexican Border Campaign, as well as during both World Wars.

Williams' business years have been spent entirely with the Consolidated Edison Company of New York, where he has served thirty-nine years. His assignments have included both engineering and purchasing. As mentioned in the above Minutes, Mr. Williams is currently Consolidated Edison's Manager of Cable Purchases.

Our speaker has been a life-long student of cycles—particularly cycles in business and in economics, as earlier mentioned. He has lectured widely on these 'pet' subjects, as well as on allied subjects.

Questions & Answers

THE 1ST DIFFERENCE INDICATOR

Q. Please give me the values of the 1st Difference Indicator for the last 20 or 39 years.

A. The values of the 1st Difference Indicator can be given from April 1919.

The 1st Difference Indicator shows the *rate* at which the Federal Reserve Board Index of Industrial Production, 1947-49 = 100, is advancing or declining. It was charted in *Cycles* for March 1957.

INDUSTRIAL PRODUCTION U. S. A.

1st Difference Indicator

Date	1st Dif. Ind.	Date	1st Dif. Ind.	Date	1st Dif. Ind.	Date	1st Dif. Ind.	Date	1st Dif. Ind.	Date	1st Dif. Ind.	Date	1st Dif. Ind.	Date	1st Dif. Ind.
J '19		J '24	0.15	J '29	0.50	J '34	0.50	J '39	0.65	J '44	-0.50	J '49	-1.50	J '54	-1.85
F		F	0.30	F	0.15	F	1.30	F	0	F	-0.35	F	-1.65	F	-1.20
M		M	0	M	0.15	M	1.50	M	-0.30	M	-0.50	M	-1.70	M	-0.80
A	-0.50	A	-0.80	A	0.50	A	1.20	A	-0.50	A	-1.15	A	-1.50	A	-0.30
M	0.50	M	-1.50	M	0.85	M	0.50	M	0.15	M	-1.15	M	-1.00	M	0.15
J	1.50	J	-1.70	J	0.85	J	-0.70	J	1.00	J	-1.35	J	-0.65	J	0.15
J	1.85	J	-1.00	J	0.50	J	-1.35	J	1.35	J	-1.15	J	-0.15	J	-0.35
A	1.30	A	0.35	A	0	A	-1.50	A	1.70	A	-0.80	A	0.50	A	-0.35
S	0.15	S	1.15	S	-0.50	S	-1.00	S	2.30	S	-0.70	S	0.35	S	0.50
O	-0.50	O	1.15	O	-1.20	O	-0.15	O	3.00	O	0	O	0	O	1.35
N	-0.50	N	1.00	N	-1.85	N	0.65	N	2.50	N	0.50	N	0.15	N	1.85
D	0.50	D	1.20	D	-1.80	D	1.85	D	1.00	D	0.50	D	1.15	D	2.00
J '20	1.35	J '25	1.20	J '30	-1.15	J '35	2.35	J '40	-0.50	J '45	0.50	J '50	1.50	J '55	1.85
F	1.20	F	0.65	F	-0.50	F	1.80	F	-1.70	F	0.50	F	1.15	F	1.65
M	0	M	0.15	M	-0.35	M	0.50	M	-1.80	M	-0.15	M	1.65	M	1.50
A	-0.85	A	0	A	-0.70	A	-0.50	A	-0.80	A	-1.35	A	2.85	A	1.50
M	-0.50	M	0	M	-1.00	M	-0.35	M	0.80	M	-2.35	M	3.50	M	1.50
J	-0.15	J	0.15	J	-1.30	J	0.20	J	1.65	J	-3.15	J	3.15	J	1.20
J	-0.20	J	0.15	J	-1.65	J	0.70	J	1.50	J	-5.15	J	3.20	J	0.80
A	-0.50	A	0	A	-1.50	A	1.00	A	1.15	A	-8,00	A	3,00	A	0.80
S	-0.65	S	0	S	-1.15	S	1.30	S	1.35	S	-8.85	S	2.30	S	1.20
O	-1.35	O	0.50	O	-0.85	O	1.50	O	1.85	O	-5.85	O	1.00	O	1.20
N	-2.15	N	1.00	N	-0.85	N	1.20	N	2.00	N	-2.00	N	0.35	N	0.80
D	-2.50	D	0.70	D	-1.00	D	0.65	D	2.00	D	-0.50	D	0.50	D	0.30
J '21	-2.00	J '26	0	J '31	-0.85	J '36	0	J '41	2.00	J '46	-1.50	J '51	0.50	J '56	0
F	-1.15	F	-0.20	F	-0.35	F	-0.35	F	2.00	F	-1.00	F	0.35	F	-0.50
M	-0.70	M	0.20	M	0.20	M	0.15	M	1.50	M	0.70	M	0	M	-0.50
A	-0.20	A	0.20	A	0.35	A	1.00	A	1.65	A	0.85	A	0	A	-0.30
M	0	M	0	M	0	M	1.50	M	2.35	M	0.65	M	-0.15	M	-0.30
J	0	J	0	J	-0.50	J	1.35	J	2.70	J	0.80	J	-0.65	J	-1.20
J	0	J	0.30	J	-0.85	J	1.00	J	2.00	J	2.35	J	-1.20	J	-1.00
A	0.20	A	0.65	A	-1.15	A	1.00	A	0.80	A	2.50	A	-1.20	A	0.85
S	0.70	S	0.70	S	-1.35	S	1.00	S	0.80	S	1.65	S	-0.65	S	2.30
O	0.80	O	0.35	O	-1.35	O	1.15	O	1.20	O	1.35	O	0	O	2.35
N	0.65	N	-0.20	N	-0.80	N	1.50	N	1.35	N	0.65	N	0.35	N	1.00
D	0.50	D	-0.35	D	-0.50	D	1.35	D	1.50	D	0.65	D	0.70	D	0.30
J '22	0.50	J '27	-0.15	J '32	-0.70	J '37	0.85	J '42	1.65	J '47	0.85	J '52	0.80	J '57	-0.17
F	1.00	F	0.15	F	-1.00	F	0.65	F	1.65	F	1.00	F	0.65	F	-0.50
M	1.00	M	0.15	M	-1.30	M	0.80	M	1.50	M	0.65	M	0.20	M	-0.50
A	0.85	A	0	A	-1.35	A	0.85	A	1.35	A	0	A	-0.50	A	-0.50
M	1.00	M	-0.15	M	-1.35	M	0.20	M	1.35	M	-0.15	M	-0.85	M	-0.33
J	1.15	J	-0.30	J	-1.15	J	-0.15	J	1.30	J	-0,30	J	-1.35	J	0.16
J	0.85	J	-0.35	J	-0.65	J	-0.20	J	1.85	J	-0.15	J	-0.15	J	0.34
A	0.35	A	-0.50	A	0.15	A	-0.50	A	2.50	A	0.15	A	2.50	A	0
S	0.65	S	-0.50	S	1.00	S	-1.65	S	3.00	S	0.65	S	4.30	S	-0.67
O	1.50	O	-0.50	O	1.20	O	-3.35	O	3.00	O	1.15	O	4.20	O	-1.50
N	1.85	N	-0.30	N	0.50	N	-4.50	N	2.65	N	1.15	N	2.35	N	-2.50
D	1.35	D	0.15	D	-0.20	D	-4.35	D	2.35	D	1.00	D	1.30	D	-3.00
J '23	0.65	J '28	0.50	J '33	-0.35	J '38	-3.00	J '43	2.15	J '48	0.50	J '53	0.85	J '58	-3.00
F	0.50	F	0.65	F	-0.50	F	-1.50	F	2.15	F	-0.15	F	0.50	F	
M	0.85	M	0.30	M	-0.35	M	-0.65	M	2.00	M	-0.50	M	0.65	M	
A	1.00	A	0.20	A	1.00	A	-0.65	A	1.50	A	-0.15	A	0.85	A	
M	0.65	M	0.35	M	3.20	M	-0.50	M	0.70	M	0.50	M	0.65	M	
J	0	J	0.50	J	4.70	J	0.15	J	0.35	J	0.80	J	0.35	J	
J	-0.35	J	0.65	J	3.65	J	1.30	J	0.50	J	0.50	J	0	J	
A	-0.50	A	0.65	A	1.15	A	2.00	A	1.00	A	-0.15	A	-0.70	A	
S	-0.65	S	0.85	S	-1.15	S	1.85	S	1.15	S	-0.15	S	-1.30	S	
O	-0.70	O	1.00	O	-2.35	O	1.70	O	1.00	O	0	O	-2.00	O	
N	-0.65	N	1.00	N	-2.00	N	1.50	N	0.15	N	-0.15	N	-2.35	N	
D	-0.30	D	0.85	D	-0.80	D	1.30	D	-0.50	D	-0.85	D	-2.30	D	

Library Additions

CLIMATE

'A Change in the Weather,' by Rachel L. Carson, *Vogue*, May 1, 1951, p. 140 (an excerpt from *The Sea Around Us*).

In this fascinating article Miss Carson discusses (a) deep ocean tides, (b) a catastrophic 1800-year cycle in climate, and (c) shorter climatic cycles of 9, 18, or 36 years. all as discovered by Otto Pettersson in his laboratory on the Gulmarfiord

In Miss Carson's words: 'Day by day, and season by season, the ocean dominates the world's climate. Can it also be an agent in bringing about the long period swings of climatic change that we know have occurred throughout the long history of the earth—the alternating periods of heat and cold, of drought and flood? There is a fascinating theory that it can.....It was developed by the distinguished Swedish oceanographer, Otto Pettersson, whose almost century-long life closed in 1941.'

Pettersson found enormous *submarine* tides—some of them 100 feet high—which varied in height and power as the tide producing power of the sun and moon varied.

The 1800-Year Cycle

Miss Carson goes on to say, 'From astronomical calculations Pettersson learned that the tides must have been at their greatest strength during the closing centuries of the Middle Ages, reaching a climax about the year 1433. Then sun, moon, and earth came into such a position at the time of the winter solstice that they exerted the greatest possible attracting force upon the sea. The heavenly bodies assume this particular relation only once in every eighteen centuries. The minimum tidal effect prevailed about A.D. 550, and it will occur again about the year 2400.'

The Theory

Miss Carson then shows from historical records how climate has varied in accordance with the great underlying tidal rhythms. Pettersson's theory is that climatic variation occurred as the result of change in oceanic circulation brought about as tide induced submarine waves disturb the deep waters of polar seas.

BATS

'Activity Rhythm in Bats Under Constant External Conditions,' by Donald R. Griffin and John H. Welsh *Journal of Mammalogy*, Vol. 18, No. 3, August 1937, pp. 337-338.

The experiments demonstrated that bats are active at 24-hour intervals even when kept many days around the clock in a sound-proof room in total darkness.

ROCKS

'Earth Rhythms,' by John H. Chase. An unpublished manuscript in the Library of the Foundation; 13 pages, 9 illustrations, 3 diagrams.

Chase, a geologist, discusses the fact that continents appear to rise and fall as if through the 'breathing' of the world. He shows the rise of America out of the sea in early Cambrian days; its sinking in late Cambrian times; its rise during the early Devonian period; its sinking in the late Devonian; its recent (geologically speaking) rise. He does not, however, allege uniformity of time intervals, i.e. precise rhythm, to these events.

Rhythm in Nature

However, he does have a concept of rhythm in nature, into which his great geological movements should fit. This is shown by his concluding remarks. It would seem to the reviewer that they apply to more than geology. Here they are:

'For several years I was able to go to Florida for a month or two during the winter.

'As we neared the shore I would try to go out alone to greet the ocean.

'And here was my dream.

The Scientist-Artist

'Some day a great scientist who was also an artist would be born. He would measure the throb of the great billows, then catch the beat of smaller waves above the swells, time the wavelets atop of these, the flash of ripples capping the wavelets, and the fairy dance of spume and froth crowning all.

'This science-artist would measure these tones and overtones mechanically just as they are produced in nature, but as he caught them correctly they would fit into an oratorio and be the true music of the sea.

'He would begin softly on a calm day when the ocean was at peace and the great billows were lazily heaving—than as the wind rose the waves would become more and more complicated and violent until as a crescendo a storm would burst and a tornado of blended sound would crash up into consciousness. After this maelstrom the wind would lower, the sea become gently, and the music die away in peace.

'In the same way in days to come a great geology-artist will join our ranks. What I have described as three simple vibrations of our mother earth he will discover to be far more complicated and more gracious in harmony. Perchance they will be like the music of the ocean.

'This artist-scientist will use calipers, surveying, trigonometry, and even astronomy to catch the accurate pulse of the world, but when he weaves these vibrations into song he will find them whispering the cosmic music of creation.

'Science and Art will be blended.

'Geology will be a Queen stepping upon her throne.'

The Cycle Workshop

HOW TO GET HINTS OF CYCLES—CONTINUED

In the January report I gave you two ways of getting hints of cycles; one of these ways involved playing around with pencils to mark the more or less equi-distant areas of highs and lows. This method is good because pencils are so easily movable and because they are bold enough against the background of the paper to help your eye to measure reasonably uniform horizontal distances. I also described a second method called 'thumbing' which I find the best of all methods for quick preliminary reconnaissance. These two methods, however, by no means exhaust our store of tricks.

Counting

A third method that I sometimes use is called 'counting.' Consider for example the chart below which shows the production of Florida oranges in millions of boxes from the crop year 1919-20 through the crop year 1956-57. The chart also shows, by means of a smooth line, an estimate of the underlying growth trend of these figures.

Thumbing did not seem to help much so I started counting the intervals between tops and between bottoms.

In counting you start out by taking into account every change in direction, relative to trend.

How to Count

Starting with the peak in 1921 we count as follows: 3 to a peak in '24; 3 to a peak in '27; 2 to a peak in '29; 2 to a peak in '31; 3 to a peak in '34; 5 to a peak in '39; 2 to a peak in '41; 3 to a peak in '44; 2 to a peak (relative to trend) in '46.

The year 1947 is much higher than the year 1946, but it is not as much above trend as was 1946. In judging turning points you must always use the trend line as a base line for your eye. Similarly 1950 is really above 1948, but relative to trend it represents an important bottom. Proceeding now with counting: 2 to a high in 1948; 4 to a high in '52; 2 to a high in '54; at least 4 to the high next following to come in 1958 or later.

Rearrangement

At first glance this gives us nothing but the following series of figures: 3, 3, 2, 2, 3, 5, 2, 3, 2, 2, 4, 2, ?. You will notice that this series of figures consists mostly of 2's and 3's. I first thought that these might average out to 2½ or 2¾ years each, but this did not seem to work out. I then noticed that the 2's and 3's seemed pretty much to combine into 5's. If you start with the crest in 1924 you get a good crest in 1928, five years later; a crest of sorts in 1934, five years later; a good crest in 1939, five years later; a good crest in 1944, five years later; a good crest in 1948, four years later (1 year short of the place where a crest 'ought' to be); and a crest 6 years later in 1954, back on the track again if we really have a 5-year cycle in this series of figures.

The same method of counting can be applied to the troughs as well as to the peaks.

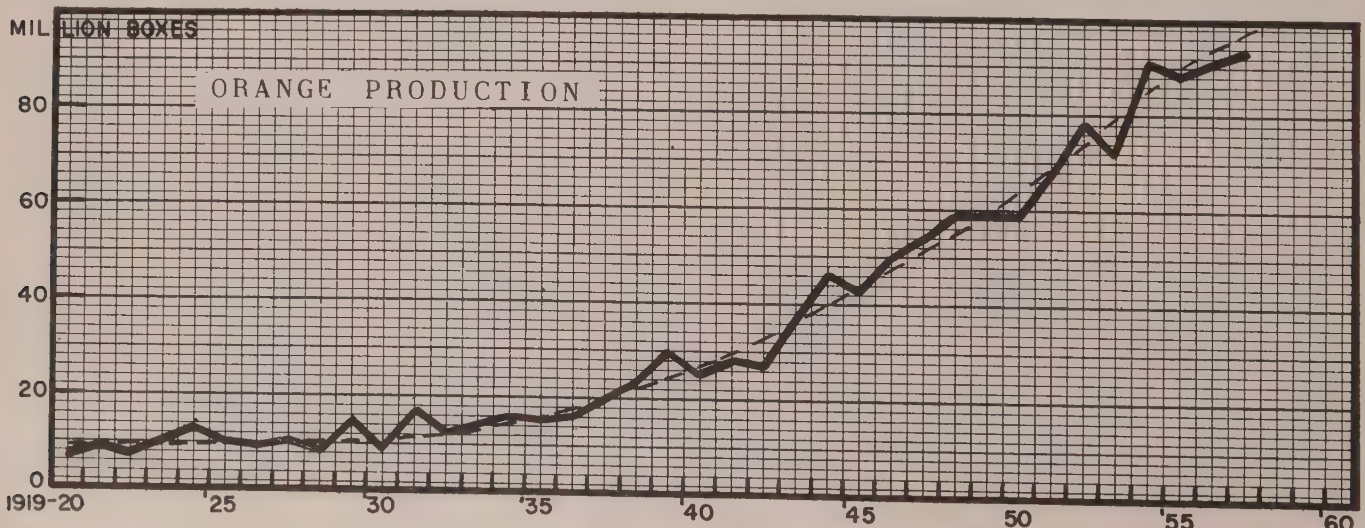
Merely a Hint

Note that this method, like all these methods of preliminary reconnaissance, give us merely *hints* of cycles. Before the cycle can be accepted it needs to be tested and verified in a number of additional ways that will be discussed later. All we have so far is a hint of a cycle 5 years long to be investigated and, *after investigation,* to be accepted or rejected.

More to Come

In another installment I will give you other ways of getting hints of cycles.

E. R. D.



The Cycle Round-up

APRIL 1958

Over the years we have covered hundreds of subjects in our monthly magazine. This section reviews a limited number of the series we have reported on in the past.

Of course we cannot include the detail that the original stories do, but this does enable us to follow the extent to which cycles are or are not continuing to dominate.

This issue brings up to date the following series of figures and cycles:

Stock Prices - 11 cycles

The combination of cycles is down at the present time. Trend is revised this month.

Bond Yields - 1 cycle

The 54 year cycle in bond yields is now on the way up.

Residential Building - 2 cycles

One current enigma is whether the spring seasonal increase will be as great as expected.

Automobiles - 4 cycles

The combination of cycles is horizontal and will not exert any upward pressure this year.

Goodyear Tire & Rubber Company - 1 cycle

The 8-year cycle is not pronounced enough at present to be reliable.

Wheat Prices - 1 cycle

The 9.3-year cycle is going down at the present time.

• • •

In addition to the items covered in this month's Round-Up, there are other series which some of you may follow from month to month.

Current figures may be of help even though we do not have the space to reproduce the chart this month.

Recent monthly figures for some of the series we have covered in the past but do not have space for this month follow:

Corn Prices - 1 cycle

The 67 1/3-month cycle is in an upward phase at the present time. The ideal top is due in April of this year. Recent monthly figures are:

Month	Dollars Per Bushel
1957 - December	1.148
1958 - January	1.108
February	1.128
March	1.175est.

This is for No. 3 yellow corn at Chicago.

Liabilities of Busines Failures - 5 cycles

The combination of five cycles and trend is upward at the present time.

Recent monthly values are:

Month	Liabilities
1957 - December	$45,325,000
1958 - January	64,442,000
February	65,295,000
March	Not available

Copper Prices - 6 cycles

The combined six cycles in copper prices reached a low in the second quarter of 1957. The combination is now on the way up.

The actual prices of electrolytic copper bars at New York for recent months are:

Month	Cents Per Pound
1957 - November	26.34
December	26.32
1958 - January	25.11
February	24.40
March	Not available

We plan to continuously expand the number of items that are covered each month in this department by using either a full page or a paragraph on the summary page.

Next month we expect to give more attention to copper prices and the liabilities of commercial and industrials failures. In the future we expect also to include pig iron prices, industrial production, cotton prices, and others.

Of course some series can be carried only yearly, when new figures become available, as Goodyear Tire & Rubber.

Waves and Cycles

Once a person develops an interest in or a knowledge of cycles he becomes intent on watching "how it came out". The Round-Up attempts to satisfy this curiosity.

However interesting it is to follow month-to-month moves in the data it is also important not to lose sight of some of the concepts about cycles.

One of these concepts is that a single wave does not make or break a cycle.

An up and down together make a wave. A single wave has one bottom and one top.

When there are a succession of waves which follow one another with measurable regularity we have a cycle.

When a cycle continues with regularity, we have behavior that cannot reasonably be random.

In fact, the probabilities that a given cycle will operate are usually given in our stories. If a cycle has occurred eight out of ten possible times, it follows that the same performance may occur in the future.

The point we are stressing here is that two out of ten times the cycle did not occur.

In following the Round-Up do not forget that if the current performance is poor, this does not necessarily affect the validity of the cycle over the long run.

G. Shirk

STOCK PRICES

In our analysis of the stock market we isolated 11 cycles. The combination of these 11 cycles is *downward* at the present time.

If these 11 cycles continue to operate as they have in the past, 1958 as a whole will be lower than 1957. Further decline is suggested for 1959 and 1960.

This combination has worked well enough in the past that it is not wise to ignore its present downward direction.

On pages 84 and 85 of this issue is a chart which shows the combined cycles compared to the actual index over the entire period, 1871 to date.

The chart below gives just the current period of the comparison between the annual averages of the index and the synthesis. The work was based on annual figures and the index used was the Standard and Poor's Combined Index of Stock Prices.

The chart below also adds the latest monthly figures and compares these to the synthesis for the year. That is, the synthesis line on the monthly chart represents a yearly average.

Although the synthesis line is smooth and regular, the actual index will bounce above and below it. This is particularly true of the monthly figures.

The 11 cycles are combined with a trend to make the synthesis. This month we have revised the trend to include 1956 and 1957 and to put all the work in terms of the new Standard and Poor's Index for which 1941-1943 = 10.

The *trend* we use is simply a straight line (fitted by the least squares method) bisecting the 1871 - 1957 period. The revision does not materially change the chart below.

The *cycles* used in the synthesis remain the same as in recent issues. They range from 4.89 years to 27 years in length. A summary table on the cycles used follows.

Length in Years	Strength % Above Trend at High	Timing: Current Ideal High
4.89	3.5%	1959.30
5.50	7.0%	1958.00
5.91	6.4%	1958.69
6.85	8.3%	1957.40
8.17	4.7%	1954.16
9.18	17.1%	1955.66
11.0	3.8%	1952.50
12.8	10.9%	1953.90
14.5	12.25%	1957.50
22.0	21.6%	1952.60
27.0	14.3%	1956.50

The Combined Index for the year 1957 was 4.8% below the Index for 1956. During 1956 the Index averaged 46.62 while during 1957 it averaged 44.38. (1941-1943 = 10.)

These are yearly averages, and of course the drop in the monthly figures was more severe.

Recent monthly values of the Standard and Poor's Combined Index are:

Month	Index
1957 - July	48.51
December	40.33
1958 - January	41.12
February	41.26
March	42.05 est.

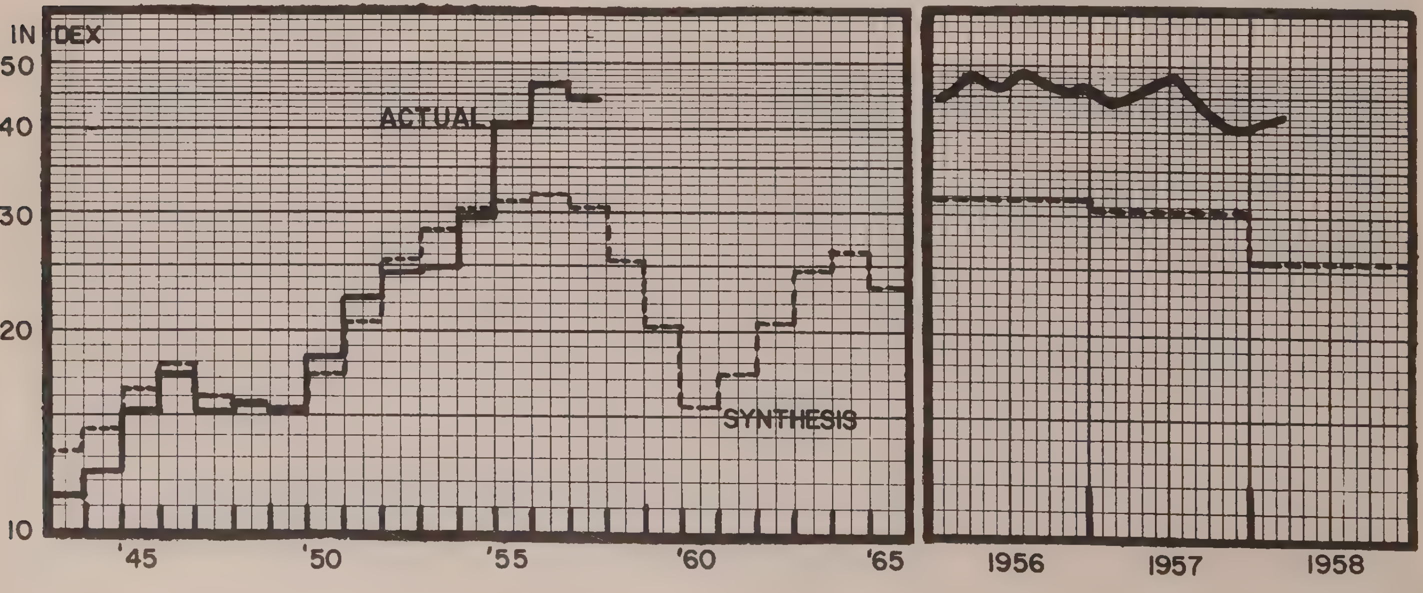
The Standard and Poor's Index includes 500 stocks, combining railroads, industrials and public utilities into one figure.

Recent monthly figures for the Dow-Jones *Industrial* Averages are:

Month	Index
1957 - July	514.64
December	436.94
1958 - January	445.68
February	444.16
March	450.42 est.

For more details on the cycles in the stock market see the article on page 83 of this issue.

G. S.



BOND YIELDS

The 54-year cycle in bond yields is on the way up toward a crest. The crest is due ideally in 1978, and we can therefore look for 20 or so years of rising bond yields.

Of course the rise will be gradual and irregular, but the cycle is dominant enough that a simple plotting of the annual figures before any smoothing reveals it.

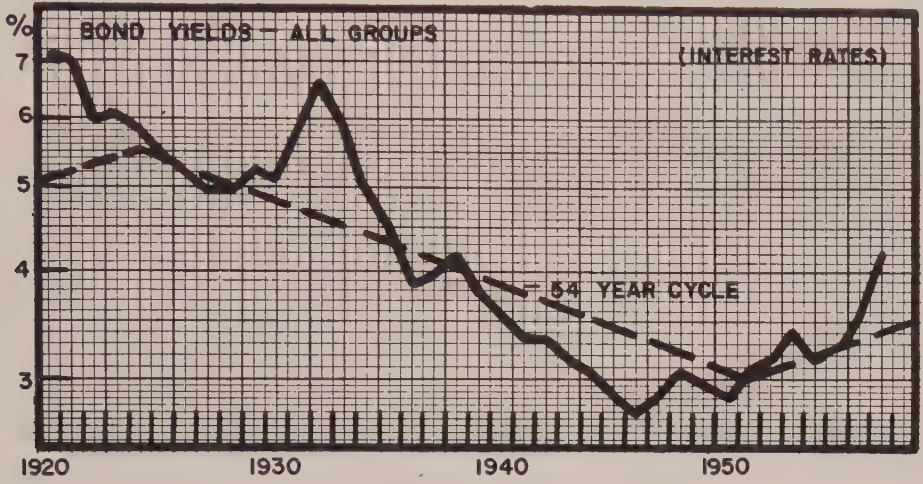
The record of yields for all groups for past highs and lows and for recent periods follows:

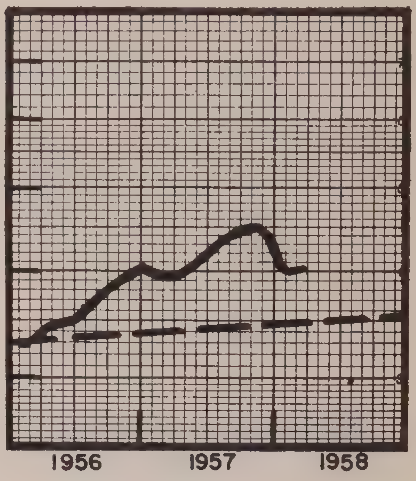
Date	Bond Yields
1920	7.08%
1946	2.74
1957	4.21
1958 -Jan.	4.06
Feb.	4.01
Mar.	4.03est.

The yields used on the chart are for all domestic corporate bonds as published by Moody's.

The cycle is equally apparent in the various groups (rails, utilities, industrials) and in the various ratings (Aaa, etc.).

Although there are many cycles present in bond yields, this is the most important one, and certainly it is one of the best known cycles.





This 54-year cycle is often called the Kondratieff cycle after its discoverer. N. D. Kondratieff first wrote about this cycle in 1926. It has been coming true ever since.

The series he used and the wave as he outlined it are given on the chart below.

The timing of the cycle used in the chart above of bond yields in the United States is an extension of the timing used by Kondratieff in the chart below.

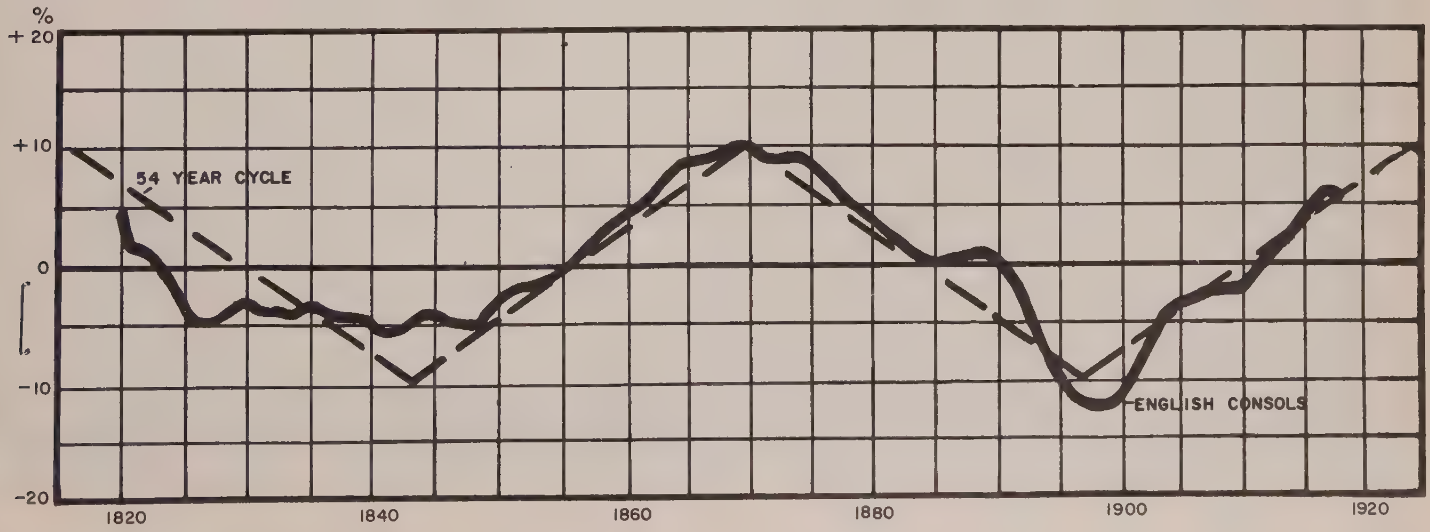
Evidently the cycle is as applicable in the United States as in Great Britain.

The 54-year cycle is also present in other series of figures. For instance, it is present in wheat prices in England back to 1260. All the evidence points to this being a real cycle.

On this basis, it is reasonable to assume that, despite a certain amount of jumping around, interest rates will climb gradually over the next two decades.

For full details regarding the 54-year cycle in bond yields, see the article "What's Ahead for Interest Rates?" by E. R. Dewey in the October, 1957 issue of *Cycles*.

G. Shirk



RESIDENTIAL BUILDING CONSTRUCTION

Contracts awarded for residential building construction in 48 states are dominated by a seasonal pattern, a 32.3-month cycle, and an underlying trend.

On the chart below the value of actual contracts awarded is shown by the solid line. The broken line on the chart diagrams the synthesis (or combination) of the seasonal cycle, the 32.3-month cycle and the trend.

These two cycles in construction are so important that the individual monthly figures cannot be evaluated without the cycles being removed.

The seasonal cycle has its low, on the average, in January of each year. Typically, the contracts awarded for residential building in January are 74.2% of the average for the year.

The seasonal high occurs in April — May of each year when the values are about 118% of the average for the year.

The average seasonal pattern for the entire year follows:

Month	%	Month	%
Jan.	74.2	July	103.9
Feb.	75.6	Aug.	104.1
Mar.	109.4	Sept.	99.2
Apr.	118.3	Oct.	107.2
May	118.1	Nov.	93.7
June	109.2	Dec.	87.1

The 32.3-month cycle has a high in March of this year after which it will go down to a low in July, 1959. The average strength at time of high is 115% of trend.

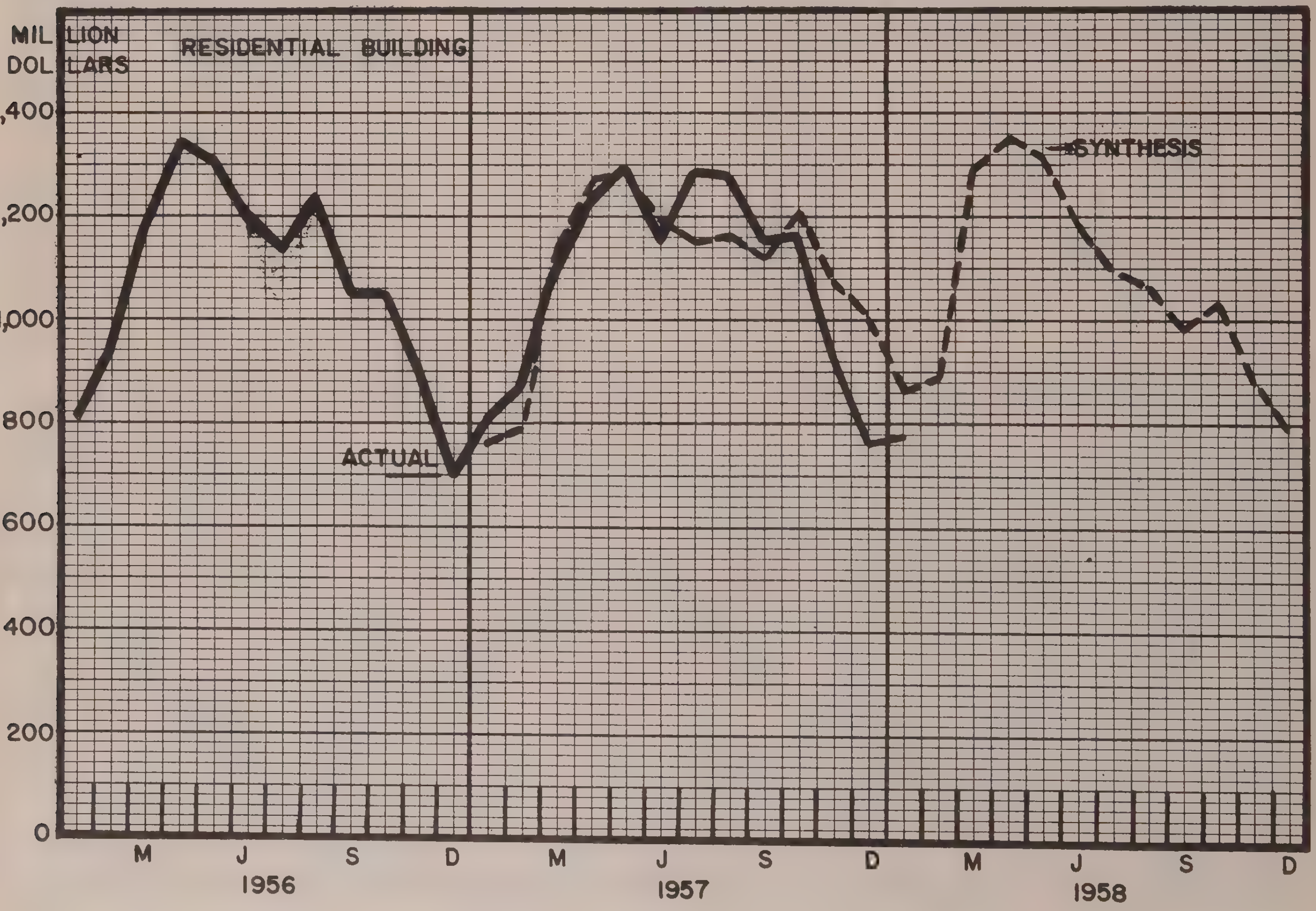
Before we decide what the underlying trend of the actual monthly values is, we remove both the seasonal cycle and the 32.3-month cycles from the figures.

Recent actual monthly values of residential construction contracts awarded are given in the following table. These are prepared by the F. W. Dodge Corporation.

The table also shows these figures after removal of the seasonal and the 32.3-month cycles.

Month	Actual Contracts Awarded (Million $)	Values Less The Cycles
1957 - Oct.	1,165	1,030
Nov.	930	924
Dec.	759	798
1958 - Jan.	777	943

For more detail see "What's Ahead for Residential Building Construction?" in the November 1957 issue of *Cycles*. *G. S.*



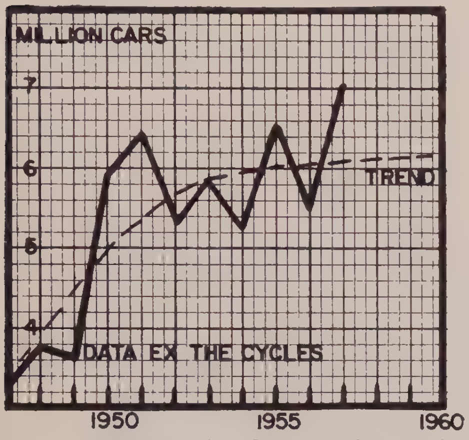
AUTOMOBILES

In the January issue we reviewed the cycles in automobile factory sales and reached the conclusion that the cycles we know about do not suggest any upturn for 1958. They do not suggest any precipitious decline either.

That is, if you think of cycles in terms of pressure, the four that we know about are not going to push up the factory sales of automobiles in 1958.

The chart across the bottom of the page shows the combination of the four cycles both with and without trend added as a broken line.

The trend used is shown here:



Of course, the level of trend used is anybody's guess. It is the total of everything we don't know about automobile factory sales. All we do know about are the four cycles. Therefore, to arrive at trend, we remove the four cycles and put the trend line through the residual.

A revision up or down in the trend line will raise or lower the line showing the combined cycles and trend below.

The cycles which were used are:

Length	Strength	Recent Tops
2.72 (YEARS)	6.2%	1956.08
3.00	7.6%	1955.875
3.41	7.2%	1954.2
6.33	23.0%	1955.28

Strength is given as per cent above trend at time of crest.

The three short lengths are fairly well known cycles in other series. In automobile factory sales they all repeat often enough and with enough regularity that we do not hesitate to include them in the combination.

The 6 1/3-year cycle, however, does have an element of doubt about it.

First, it is not present, so far as we know, in other series; second, it does not have too many repetitions in a series this short; third, it has not been too regular over the period for which we do have figures.

However, it has just enough credence for us not to ignore it, and it is therefore included in the combination.

In addition to these four cycles, there are undoubtedly others of which we have no knowledge as yet.

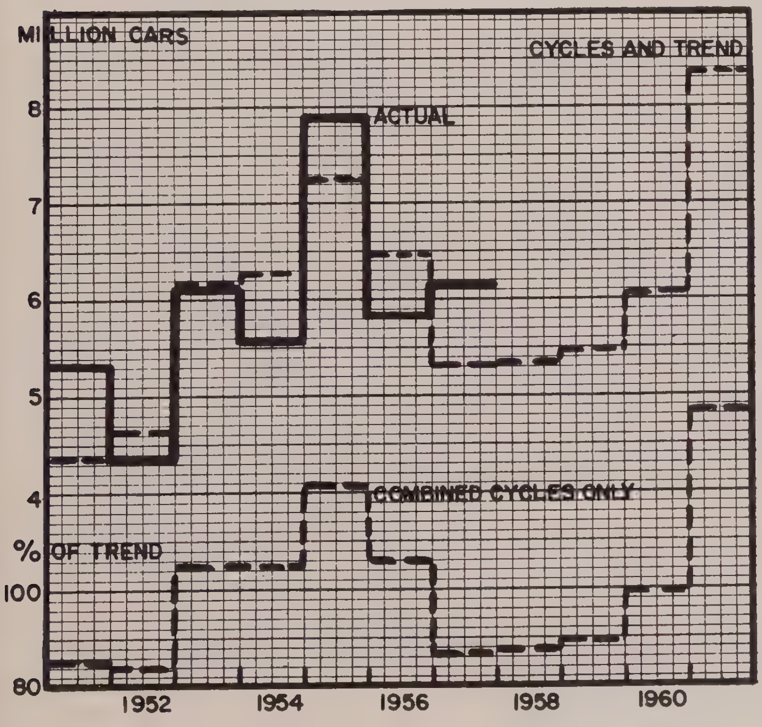
Then too, there are non-cyclic random factors which affect the level of automobile factory sales. It is not within our province to assess these.

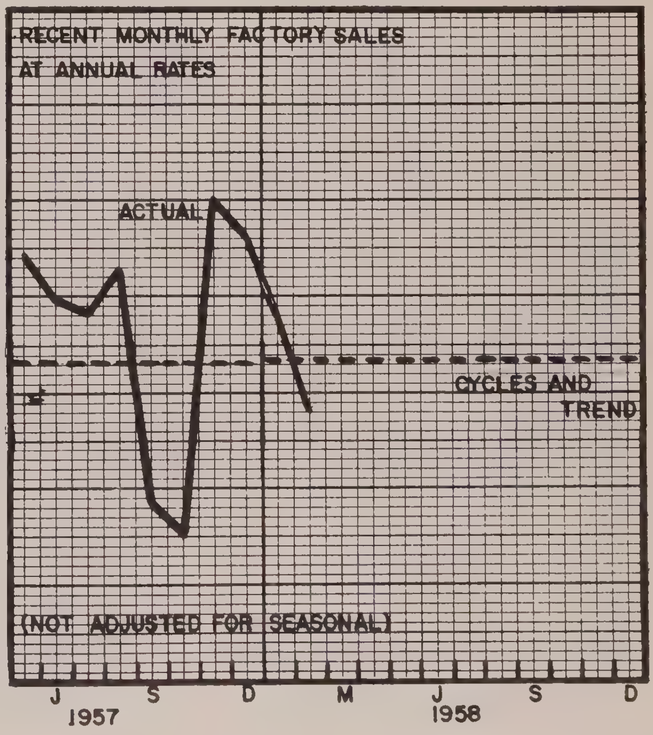
But if we cover all the areas of doubt with the blanket statement, 'other things being equal', then we can use what we do know about the cycles in this series to reach some conclusion.

And that conclusion is that not before 1960, and especially 1961, can we expect the cycles in automobile factory sales to exert an upward pressure.

For more detail see 'What's Ahead for the Sales of Automobiles', by E. R. Dewey, in the January, 1958 issue of *Cycles*.

G. Shirk





An analysis made in 1953 of the net sales of the Goodyear Tire and Rubber Company revealed the presence of an average wave eight years long. Because the data start in 1926 there are only four repetitions of the wave, and it is a little doubtful that we should call a wave with only four repetitions a cycle.

Nevertheless the waves were large and regular in the 1926-1953 period and we reported to you about this possible cycle in 1954 and 1956 because we considered the series worth watching.

With the addition of later net sales figures we have brought the work up to date to check how the 8-year wave has come out.

Some of the past and the more recent sales figures are:

Year	Sales-Millions of Dollars
1929	256.2
1932	109.1
1937	216.2
1941	330.6
1953	1,210.5
1954	1.090.1
1955	1,372.2
1956	1,358.8
1957	1,421.9

How the wave has come out can be seen on the charts on the opposite page.

Fig. 1 diagrams sales with a solid line and the moving average trend of sales with a broken line.

Fig. 2 shows the difference between the two lines on Fig. 1. That is, the solid line on Fig. 2 gives the percentages that sales are of trend.

On both charts the heavy black portions of the curves show how the data have developed since 1953.

The dotted portion of the percentage line on Fig. 2 is based on an extrapolation of the moving average trend. Because a moving average loses values at the ends we extend the line of the moving average out to the end of the data to get possible percentages to use on the percent line.

The ideal, or average, 8-year wave is shown on Fig. 2 by the broken zig-zag line.

The average wave has an ideal crest at 1952.75 and every eight years forward and backward from that date. The troughs come four years before and after crests. Thus, an ideal trough was to come at 1956.75.

How It Came Out

As you can see, the actual crest occurred at 1951.50, a year and a quarter early. And the out-of-phase low in the data for the year 1954 made an early low in the percentage line. The low in the data in 1954 is out-of-phase only with respect to the 8-year wave. It may be due to other cycles, or it may be random.

Certainly, this is not behaving as well as it could. But you will observe that the percentage (that the data are of trend) at the time of the scheduled bottom will probably be lower than it was at the previous top.

Fundamentally, the analysis purports to say that the percentage that the data are of the moving average will be lower in the year of low than in the year of high.

In that respect, the wave has come out very weakly. If one concludes that the actual performance compared to the ideal line is so poor at the 1956 low that it rates a zero, then the effect is to reduce the odds.

In 1953 one could have said that three out of three troughs have been reasonably on time. Now one would say that three out of four troughs have been on time.

The addition of two or three more years of figures will give us a firmer conclusion about this possible cycle.

The next top is due to come ideally at 1960.75. If we follow the course of the data toward that scheduled peak we will have a better answer about the validity of this wave.

If an 8-year cycle is actually present in these figures, it should not be ignored. The amplitude of the wave in the past has been considerable, the typical strength being 24.4% above trend at time of crest.

The Question

The fundamental question at the time when we first discussed this wave was whether this was accidental, the result of chance, or whether it was cyclic and regular, and could be expected to continue.

The Answer

There is little question but that there has been a strong 8-year force present in these figures in the past. You can see it plainly in the line of the original data in Fig. 1.

The poor performance of the actual data for just one turn around an ideal wave does not destroy the validity of the cycle. It does reduces the odds.

The odds have been reduced, but the chances are still fair that this wave is a cycle. 1960 will tell more of the tale.

We are buttressed somewhat in this conclusion by the knowledge of a cycle of this length in a variety of other series.

An 8-year (or 7.95-year) cycle has been found in Lynx abundance, in pig-iron prices, in steel ingot production, in sunspots with alternate cycles reversed, and in cigarette production.

The Lynx abundance series covers a span of 216 years, and the work on pig iron prices covers a span of 168 years.

See also "The 8-Year Cycle in Goodyear Tire and Rubber Company Sales, 1925-1955" and Part IX: The 8-Year Cycle of "The 1956 Postscript to Cycles—The Science of Prediction", both in the October, 1956 issue of Cycles

G. Shirk

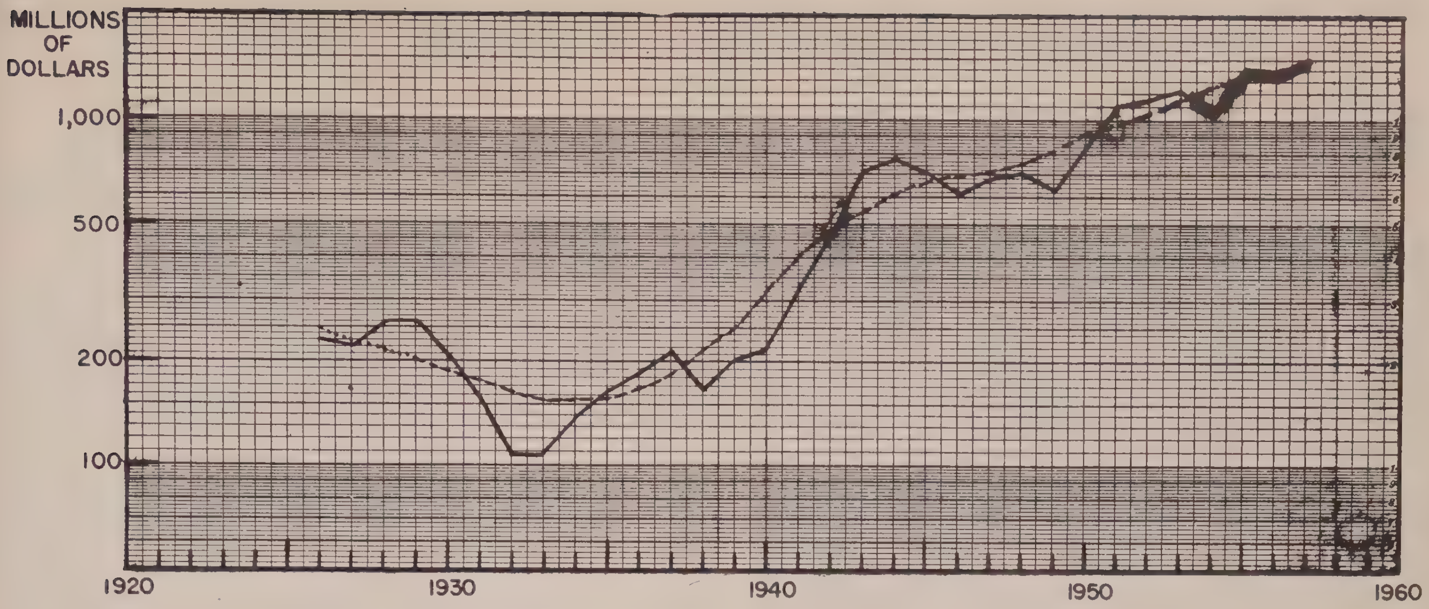


FIG. 1. GOODYEAR TIRE AND RUBBER NET SALES, 1926—1957.

The broken line shows a seven-year moving average trend, first and last four years estimated. Ratio Scale.

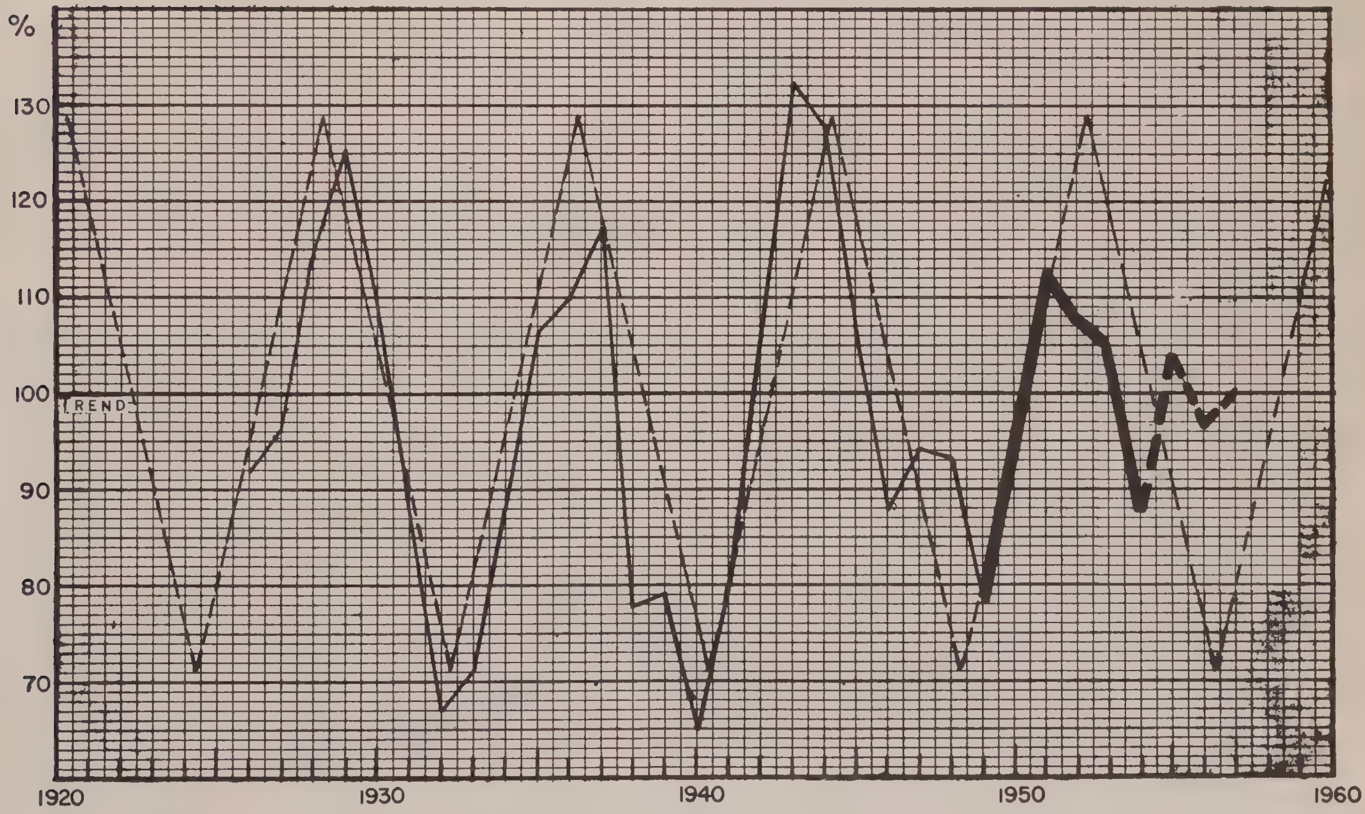


FIG: 2. GOODYEAR TIRE AND RUBBER NET SALES, 1926—1957.

The solid line shows the percentages that sales are of trend.
Heavy line shows how cycle has unfolded since discovery. The zigzag line diagrams a perfectly regular 8-year cycle.

WHEAT PRICES

The most important of the cycles that appear to influence the price of wheat is one 9.3 years long.

This 9.3-year cycle is now on the way down to a bottom which is due to come ideally at February, 1960.

The broken line on the chart below diagrams the ideal cycle after it has been combined with trend. As with any ideal cycle, this line represents the average of past experience.

Past experience in this case is the period 1859-60 through 1956-57. Over this time the price of wheat has been lowest, with respect to trend, at 9.3-year intervals spaced so that the next period of low prices should center about the early part of 1960.

We do not like to call this a forecast because we do not expect that wheat prices in the future will match precisely the extension of the average past performance of the 9.3-year cycle.

There are many factors, including other cycles, which will also affect the price of wheat.

Nevertheless it is possible to find out to what extent we can rely on the 9.3-year cycle by checking the extent to which it has dominated in the past.

The following table gives the actual price of wheat at the times of ideal high and low, the turning points of the 9.3-year cycle. It covers the entire period studied.

Turning Points			Actual Price	Price Decline
Feb.	1867	Low	189.4	
Oct.	1871	High	118.1	
Jan.	1876	Low	105.1	13.0
Feb.	1881	High	97.8	
Oct.	1885	Low	87.3	10.5
May	1890	High	94.3	
Jan.	1895	Low	52.9	41.4
Sept.	1899	High	72.4	
May	1904	Low	96.3	-23.9
Jan.	1909	High	105.5	
Aug.	1913	Low	87.6	17.9
Apr.	1918	High	224.1	
Dec.	1922	Low	124.8	99.3
Aug.	1927	High	138.8	
Apr.	1932	Low	58.9	79.9
Nov.	1936	High	123.3	
July	1941	Low	100.0	23.3
Mar.	1946	High	177.0	
Nov.	1950	Low	244.6	-67.6
July	1955	High	267.8	

The prices and declines are given in cents per bushel..

The decline column shows what actually happened to the price of wheat during each down-leg of the 9.3-year cycle since 1859.

Seven out of nine times the actual price of wheat has gone down during the ideal decline.

The odds are thus 7 to 2 that the actual price of wheat at the next ideal low will be below the price at the last ideal high.

This study was based on No. 1 Dark Northern Spring Wheat at Minneapolis.

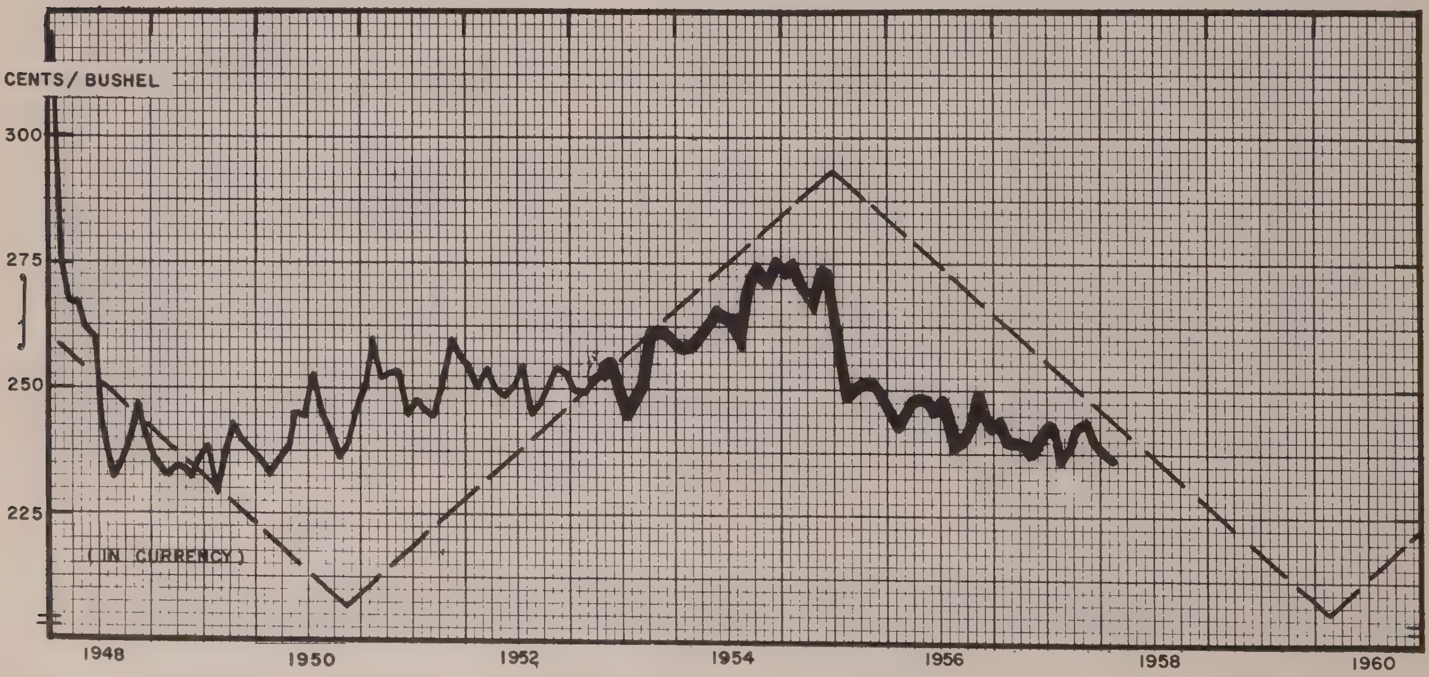
Annual averages were used in the work, but it is possible to follow current prices with monthly figures.

The solid line on the chart below diagrams the average monthly price, and the recent figures are:

	Month	Cents/Bushel
1957 -	November	243.9
	December	239.0
1958 -	January	237.5
	February	236.5
	March	Not available

See also "What's Ahead For Wheat Prices" in the September, 1957 issue of *Cycles*.

G. S.



Geisinger Indicator

BACKGROUND

The Modified Geisinger Indicator is a series of numbers which, in the past, have gone up and down ahead of corresponding movements of the Federal Reserve Board Index of Industrial Production. The Modified Geisinger Indicator thus throws some light on the probabilities of the future.

The F. R. B. Index of Industrial Production measures physical production in the U. S. A. It is a weighted average of tons, yards, gallons, and numbers of things produced each month.

The Modified Geisinger Indicator is the sum of two Indicators, the Geisinger Indicator and a First Difference Indicator.

The Geisinger Indicator was invented by Robert Geisinger. It is derived from figures which are published each month in the *Survey of Current Business*. It is charted for you as Curve A on pages 106 and 107

Curve B on these same two pages charts the First Difference Indicator, which is merely the amount by which the smoothed F. R. B. Index is above or below the value for the preceding month. The smoothing is effected by means of a centered 3-month moving average posted to the second position.

Curve C charts the sum of the values of Curve A and B. This curve is called the Modified Geisinger Indicator. It suggests in a general way what the F. R. B. Index may do some eight months later.

Curve D charts the values of the F. R. B. Index of Industrial Production smoothed.

Curve E re-charts Curve C, advancing it by 8 months. This advance is for two reasons (1) so that you can more easily compare the past behavior of the Modified Geisinger Indicator with the behavior of the F. R. B. Index, and (2) so that you can have a better idea of what the F. R. B. Index may do in the future.

FORECAST

The Federal Reserve Board's seasonally adjusted Index of Industrial Production declined again. It dropped from 133 in January to 130 in February. This is the sixth straight month of decline.

Revisions in the Index made by the Federal Reserve Board make the 1st Difference Indicator for December -3.00; its value for January is also -3.00.

The 1st Difference Indicator has not previously been as low as this except at the end of World War II and in 1937.

The Geisinger Indicator for November 1957 (July 1958 when projected) is down to -4.2. It has been as low as this only twice before: In October 1948 (followed by the setback of 1949); in July 1953 (followed by the setback of 1954).

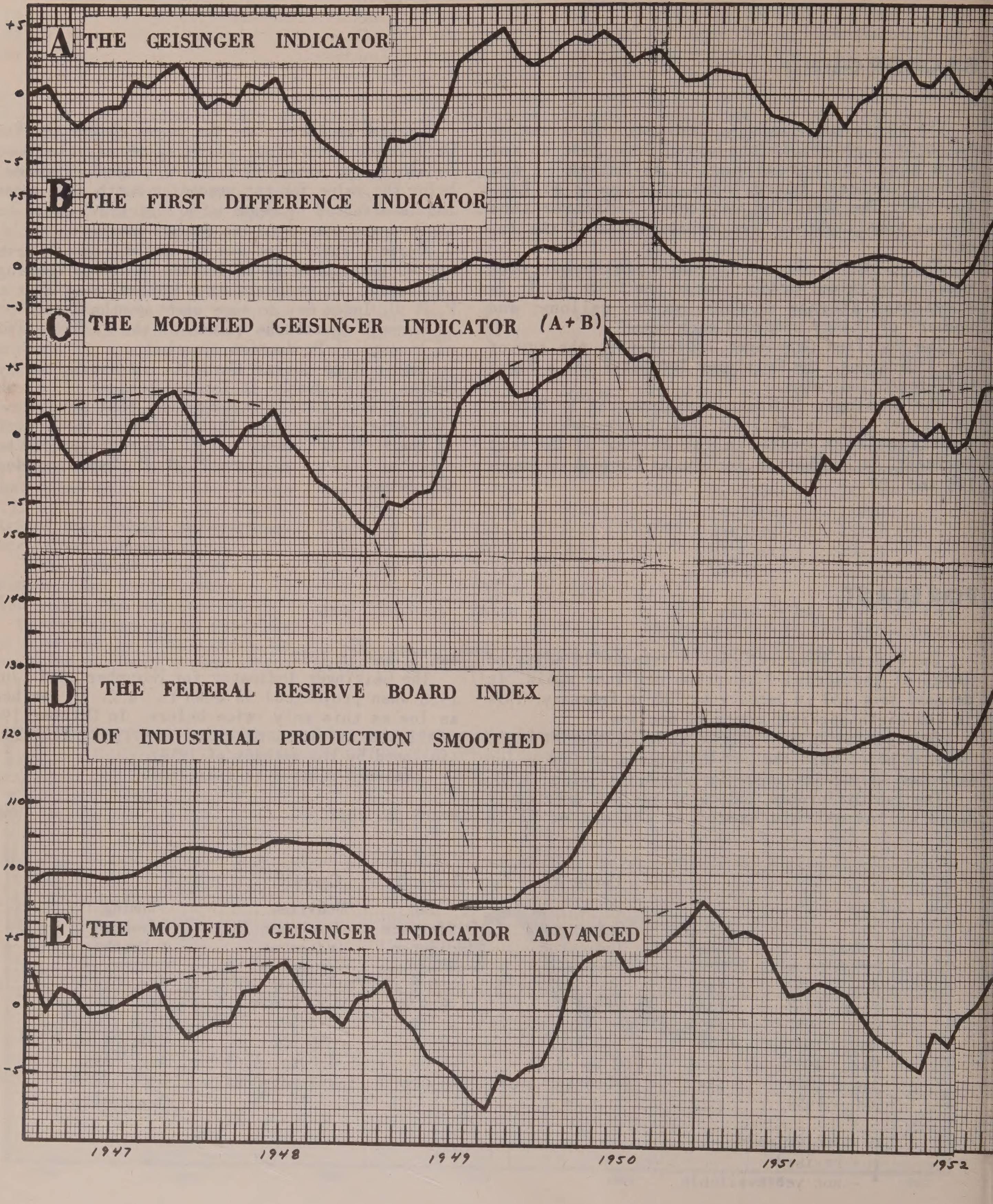
Continued caution is indicated.

March 26, 1958 *E. R. Dewey*

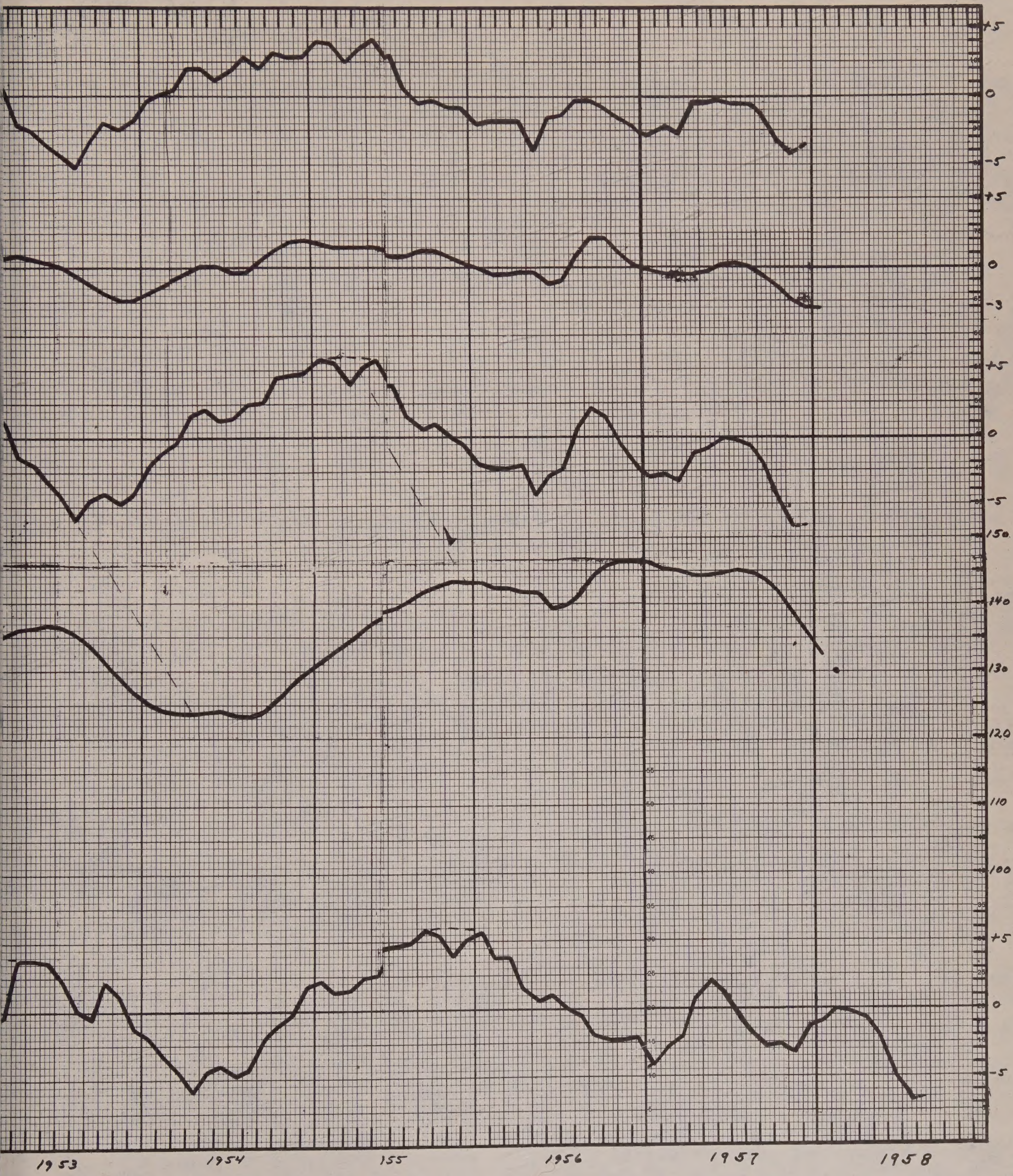
Month	F.R.B. Index	Curve A Geisinger Indicator	Curve B 1st Difference Indicator	Curve C Modified Geisinger Indicator	Timing Advanced 8 Months
Aug. 1957	145	-0.6	0 r	-0.60r	Apr. 1958
Sept. 1957	144	-1.4	-0.67r	-2.07r	May 1958
Oct. 1957	142r	-3.4	-1.50r	-4.90r	June 1958
Nov. 1957	139	-4.2	-2.50r	-6.70r	July 1958
Dec. 1957	135r	(0 to -3.6)	-3.00r	(-3.0 to -6.6)	Aug. 1958
Jan. 1958	133	(+0.6 to -3.8)	-3.00p	(-2.4 to -6.8)	Sept. 1958
Feb. 1958	130p	*	*	*	Oct. 1958

p - preliminary
r - revised
* - not yet available

THE MODIFIED GEISINGER INDICATOR



OF INDUSTRIAL PRODUCTION



Turn to page 105 for the forecast.

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